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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Current Issue.

The "Bunchy Top" Investigation Committee has presented its final report. Its findings and recommendations, which are of far-reaching importance to banana growers, are summarised in this issue. Mr. White has an interesting note on the destruction of Khaki weed. Cassava as a stock food is discussed by Mr. Brooks. The rearing and feeding of chickens are described by Mr. Rumball in an instructive note. Mr. Shelton's subject this month is the Tamworth pig, on which he gives a lot of valuable information; he has also a note on diarrhœa or white scour in pigs. A summary of an address by the United States Minister for Agriculture on surplus production and marketing problems is reprinted. Facts disclosed by veterinary research in respect to forage poisoning are also among reprinted matter. Though somewhat lesser in volume than usual, the June Journal contains much useful information and will be welcomed by readers generally.

Agricultural Conference—Meeting of Ministers.

An interstate conference of Ministers of Agriculture was held this month at Brisbane. The conference was convened by the Queensland Minister (Hon. W. Forgan Smith) and met in the old Legislative Council Chamber at Parliament House. Administrative and technical experts from each State also attended and took part in the deliberations, and assisted on special committees appointed to examine and report on several of the agenda proposals. The Premier of Queensland (Hon. W. McCormack) officially opened the conference, the purpose of which was to discuss rural matters and problems of common concern. The Hon. W. Forgan Smith was invited by unanimous vote to preside. Many matters of moment were considered, and agreement was reached on many important points. The setting up of permanent wheat standards, the placing of an embargo on black-grown maize, acceptance of uniformity in grade standards for exports, the stabilisation of the dairy industry and improvement in marketing methods, and legislative control of the use of sires for dairy herd improvement were among the more notable decisions of the conference.

Queensland's Needs.

"Queensland is a big State, with a small population and immense natural resources. Its great need is development. Queensland needs more people, and more scientific methods of exploiting its natural resources," observed the Premier (Hon. W. McCormack) in the course of his opening address at the Agricultural Conference. After welcoming the delegates from the other States to Queensland on behalf of the Government, he further remarked that they had met to discuss matters affecting the agricultural welfare of the whole Commonwealth, and, therefore, had very important work ahead of them. They would have to deal with many problems caused by a wide range of climate, and due to a wide sphere of agriculture, extending from the humid tropics to some of the coldest portions of Australia. He trusted their work would be so successful that the States generally would benefit as a result of the exchange of views by the Ministers and technical officers of an important part of their governmental system. One of the greatest problems facing Australia at present was how to make provision against prolonged dry periods. In the last analysis the problem of agriculture in Australia was the conservation of fodder and water. He hoped that when the visitors returned to their respective States, what they had seen of Queensland would enable them to dispel the notion, in some people's minds, that in Queensland they were "a crowd of bushrangers and Bolsheviks." The evidences of prosperity in Queensland and the remarkable progress made could not, he thought, fail to impress the visitors from the other States of the Commonwealth.

Protecting the Maize Grower.

"That consideration be given to the desirability of making further representations to the Commonwealth Government for an embargo on black-grown maize for the protection of the Australian industry" was the text of a Queensland motion at the conference of Ministers. The Chairman (Hon. W. Forgan Smith) declared that the maize industry could be extended to meet all the requirements of Australia. South Africa was a considerable grower of maize, and large quantities of that black-grown maize had, on various occasions, been dumped in Australia to the detriment of those engaged in the production of maize here. The Queensland Government had, for some considerable time, been in communication with the Federal Government in respect to duty on black-grown maize, and the Commonwealth had quite recently seen fit to accept Queensland's suggestions.

"It is felt by the Government of Queensland," continued the Minister, "that we, having adopted Australian living standards, these should not be menaced by our being forced into competition with countries whose standards of production are much cheaper, due to the low wage conditions that operate in those countries."

He thought it was a fair and sound proposition that that principle should be accepted. No one at that conference, he thought, would argue that Australia should be expected to carry on an industry in competition with coolie labour in other countries. That, briefly, was the principle embodied in the resolution. Certainly, the increased tariff granted by the Commonwealth recently would improve the position very considerably, but he was a strong believer in the principle of an embargo against the form of competition to which he had alluded. The motion was carried.

Stabilising the Dairying Industry.

The economical condition of the dairying industry was also reviewed by the conference delegates. The Hon. W. Forgan Smith moved, on behalf of Queensland, that consideration be given to the proposal to stabilise dairying by setting up butter and cheese boards in each of the States to act in collaboration with each other and with the Federal Dairy Produce Export Control Board in marketing.

The resolution aimed, he said, at stablising prices with the view of giving those engaged in the industry that decent standard of living, which they had a right to demand in a free community, and a scientific system of distribution. Every Government in Australia had considered carefully the principle of stabilising prices. In Queensland they had a Primary Products Pools Act, and had introduced a system of control which, in its limited application, had been of definite advantage to the farming community.

At the request of the Chairman, the Director of the Queensland Producers' Association (Mr. L. R. Macgregor) addressed the conference. He said the Queensland Government of late years had enacted a very comprehensive code of agricultural legislation, which covered the marketing of primary products. The farmers were being encouraged to avail themselves of the most modern methods of co-operative production, and to combine together on the basis of compulsory agricultural pools. They had in Queensland twelve marketing boards constituted for the purpose of bringing about a more orderly system of marketing of the products concerned. The

policy was to encourage the producers to investigate their own problems and to assist them in their marketing activity. Queensland had agreed to give the Paterson scheme a trial, and in January last a change came over the butter situation. To prove this he directed attention to a graph showing the weekly prices of butter on the local, interstate, and overseas market in 1925, and for the first four months of the current year. He demonstrated that for the first time for many years local prices were about 9s. 4d. a cwt. (1d. a lb.) higher than prices on the London market. Comparing the beginning of 1926 with the beginning of 1925 they would find the overseas market about par, whereas the local market prices of 1926 were about 56s. a cwt. (6d. a lb.) higher than 1925, the advantage to Victoria being particularly noticeable. Of course, the levy of 1s. 2d. a lb. to effect equalisation had to be taken into account. The benefits of the Paterson scheme were clear, but would the scheme, as constituted on a voluntary basis, hold together? One reason why they asked that stabilisation should be effected by legislative authority was that voluntary schemes were loosely held together. Stability meant the bringing about of regular, even conditions, and more stable conditions of prices.

The proposal was debated generally. Every delegate desired to see an improvement in the conditions of the industry, but there were differences of opinion as to how improvement might be effected. In the course of his reply, Mr. Forgan Smith said the object of the motion was not to justify the Paterson scheme, which was merely an expedient of the dairymen of Australia to cope with conditions as they found them. From the point of view of hard and fast economics that scheme could be attacked from various standpoints, but the dairyman had used the only power at his disposal to improve his conditions. He himself took the view that no one had the right to get any commodity cheap, if its cheapness depended on the sweated labour of the men, women, and children engaged in that industry. The dairymen of Australia, in his opinion, were in the same position as working men without organisation. The motion in a slightly amended form was ultimately carried.

Eggs—Uniform Grade Standards.

The conference agreed to the principle of uniform grade standards for eggs in the States, and for export; and also the inclusion of eggs in shell, and in pulp in the Commonwealth Commerce Act. The Chairman (Hon. W. Forgan Smith) said that there was a great field for the extension of the poultry industry in Australia. It was not generally known that it was the fourth most valuable rural industry in the United States. That showed the capacity there was for its extension in Australia. Up to the present, eggs for export had not been included in the Commerce Act, and they could consequently be exported without inspection or a uniform grade being insisted upon. He had received at least three deputations since he had been Minister for Agriculture, with a request, on behalf of poultrymen, that grades for export be established. A department committee was instructed to draft uniform standards, and report its decisions to conference.

The White Man in the Tropics.

Australia, and particularly Queensland, provides a convincing test case for those who still cling to the extraordinary belief that the tropical areas of this continent cannot be developed without coloured labour. Dr. R. W. Cilento, Director of the Australian Institute of Tropical Medicine, in his recent work, "The White Man in the Tropics," gives many very interesting facts that are sure to shock the dogmatising theorist on conditions of living north of Capricorn. Dr. Cilento points out, "the white man in tropical Australia is in different circumstances from the white man in practically every other tropical location. Elsewhere in the tropics the white man is an official, a missionary, an overseer of labour—forming an almost negligible white superstratum on the black mass of a native population teeming with disease. In tropical Australia the native population is almost negligible, and the white man performs every kind of labour, from the most menial to the most intellectual."

It used to be held that the white man could not live in the tropics if he worked; Dr. Cilento shows that the white man cannot thrive in the tropics unless he works. "The tropical areas of Australia are unique in that they have no teeming native population, riddled with disease, but are occupied by many thousands of pure-blooded European settlers (103,000 along the eastern coast of Queensland alone). These settlers make up altogether the largest mass of a population, purely white, settled in any part of the tropical world, and represent a huge, unconscious experiment in acclimatisation, for here the white settler is not in a position of lord of a native race, but is simply a working man carrying out every occupation." Having shown by medical research statistics, culled carefully over many consecutive years, that the North is not necessarily inimicable to health, Dr. Cilento deals drastically, however, with the need of reform in tropical housing.

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS.

Select Good Seed.

During planting operations reject all seed showing tunnels of the weevil borer, or that may have been derived from a locality known to be borer-infested. Such seed often harbours eggs or young larvæ, and after planting same the latter may devour so much of the "sets" as to make them worthless for support of the young shoots, or perhaps result in their dying later on, thus causing unsightly misses. Moreover, by means of such diseased seed, the weevil often obtains a footing in clean localities, and once becoming established is not easily got rid of.

Should a grower wish to save seed of a valuable variety of cane chancing to show evidence of the presence of this borer, such sets should be immersed for half an hour before planting in water heated to a temperature of from 55 to 60 deg. Centigrade.

When using top-plants of Badila or similarly soft varieties, keep a lookout for moth borers, the presence of which is betrayed by tunnels opening on to the rind, blocked more or less by webbing and pellets of excreta.

How to Fight the Weevil Borer.

The following simple remedies are within the reach of all growers:—

(1) *Burning the Trash.*—Immense numbers of these beetles and their larvæ can be destroyed in this way on plantations where fly parasites of this borer have not been liberated.

(2) *Stripping the Trash.*—This can be carried out on areas where tachinid flies have been established, and is recommended as serviceable, since this weevil usually hides behind loosened leaf-sheaths, and, being a lover of seclusion and darkness, is repelled by additional light and air admitted between the cane rows.

(3) *Bait Traps.*—These consist of pieces of split cane about 18 in. long, in number from fifteen to twenty, which are placed in little heaps on headlands adjoining borer-infested cane, and loosely covered over with débris sufficient to keep the cut surfaces from drying up too quickly. We have found it a good plan to lay these heaps in excavations (about 12 by 20 by 8 in. deep) made in the unbroken soil, as by this method the cane retains its moisture and emits the attractive odour of fermentation for a longer period, and also encourages the beetles to remain in the heaps and oviposit in the pieces of cane. Such traps should be visited every second day to collect and destroy the weevils. Later, when baits need renewing, the old pieces should be burnt, in order to destroy eggs or young larvæ.

Combating Grasshoppers.

Indications at present point to the possibility of trouble arising this season from grasshoppers. Fortunately, the occurrence of this pest is confined to small areas; and if taken in time, while the hoppers are small and unable to fly, serious damage can usually be prevented. The following methods of poisoning these insects are recommended:—A poison bait that has proved very successful is made from 100 lb. of coarse bran (the coarser the better), with 4 lb. of finely powdered crude arsenic or Paris green, 4 lb. of cheap-grade granular dairy salt, 2 gallons low-grade molasses, 3 oz. amyl acetate, with 10 to 12 U.S. gallons of water. If bran be not obtainable, sawdust might be substituted. When large amounts of the bait are being used the arsenic should be added to the liquid ingredients instead of being mixed with the bran while dry. Another good poison bait is given in our Entomological Hints for June, 1925 (see "Queensland Agricultural Journal" and "Australian Sugar Journal" for month of June). Spraying a strip of grass around or in front of an invading swarm with 1 lb. sodium arsenite, 4 lb. treacle, and 16 gallons water has also been advised, it being important that the poison and the treacle should be dissolved separately in hot water and mixed when cold. To treat six acres one needs 28 lb. arsenite and 1 cwt. treacle.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (21st May, 1926) from Mr. E. Jarvis, Entomologist at Meringa, near Cairns:—

The following progress report is submitted dealing with the past and present economic position of this Sugar Experiment Station, and with our work here during the period April to May, 1926:—

Referring very briefly to the establishment of this Entomological Laboratory at Gordonvale in the year 1911, canegrowers will doubtless recollect that at this initial stage of the cane-grub investigation our work was directed chiefly against the so-called "grey-back cockchafer," although incidentally embracing also research work regarding larvæ of a few other closely related species of scarabæidæ, some of which were known to cause appreciable damage to cane. Before attempting any control work, however, it was first necessary to learn something about the life-history and ecology of these beetles; and accordingly three years were devoted to such essential studies. These were followed up in 1914 by an aggressive campaign, when numerous forms of repression were instituted with a view to combating both the grubs and beetles of our notorious cane pest *Lepidoderma albohirtum* Waterh.

During this second period a preliminary list was prepared of all insects observed to affect sugar-cane in the Cairns district; comprising those species attacking the leaves, boring the sticks, or devouring the roots (see Bulletin No. 3, Division of Entomology, 1916).

The results of subsequent investigations during a third period, extending from 1917 to 1921, have been published in Bulletins Nos. 7, 8, 10, 15, Division of Entomology; these, in short, consisting (1) in efforts to determine the effect of white arsenic on cane grubs, when sprinkled in drills before planting the sets, or buried alongside cane rows on grub-infested areas, and (2) the establishment of *Ceromasia sphenophori*, a dipterous parasite of the weevil borer (*Rhabdocnemis obscurus*) in the Cairns and Babinda districts.

It may be mentioned here that specimens of these useful Tachinid flies were procured for this purpose from Mossman, where they had previously been liberated during 1910 by Mr. F. Muir, in fulfilment of an agreement made between him and Mr. Henry C. Tryon just prior to the introduction of this parasite by the former entomologist from New Guinea into Hawaii.

During the last five years (constituting a fourth period) from 1921 to 1926, our general outlook and sphere of operations has naturally widened considerably, and at present deals with many phases of control work, designed to combat the ravages of cane insects admitted to be of primary economic importance.

Although about thirty-three different species are known to be more or less injurious to this crop in the Cairns district, about seven only of these should be held responsible for serious damage. Our efforts, indeed, are at present directed chiefly against four insects, viz., the "grey-back cockchafer" (*L. albohirtum*); the "weevil borer" or "cane borer" (*R. obscurus*); French's cane beetle (*Lepidiota frenchi* Blackb.); and the Giant Termite (*Mastotermes darwiniensis* Frogg.). Additional species which have of late furnished cause for complaint from growers in other sugar-growing centres, and may prove troublesome in the future, are:—*Pentodon australis* (stem gauger); *Metoponia rubriceps* Macq., a stratiomid fly (some species of which are termed soldier flies) and *Monocrepidius sp.* (wireworms).

About twenty different control methods applicable to the grey-back cockchafer have been tested at this laboratory from time to time; many of which, however, although of great scientific interest, have gradually given place to such cheap and simple remedies as fumigation of the grubs, or wholesale capturing of the beetles in time to prevent oviposition.

During the last three years this pest has been under effective natural control here, owing to a fortunate occurrence throughout certain critical stages in its metamorphosis of adverse climatic influences; which, by retarding and in some localities preventing the emergence of vast numbers of these beetles from their subterranean pupal chambers, have time and again operated as a severe check on its numerical increase.

Trap-Trees for Cane Beetles.

Among various methods of combating *albohirtum* (grey-back) during its imago or perfect condition, that of collecting the beetles deserves serious consideration. In the early days of canegrowing on the Mulgrave and Hambledon areas it was customary during the beetle season for the mills to encourage such work, the usual procedure being to shake these cockchafers from their feeding-trees at break of day, while too torpid to take to wing. As previously pointed out in 1917 (Bulletin No. 17, pages 43 and 44) collecting to be of any decided benefit should not only be

practised systematically and on an extensive scale, but also be under direct supervision of an entomologist. Certain drawbacks attendant on indiscriminate collecting, coupled with labour difficulties, may, I think, be held responsible for the abandonment of this control method throughout the Cairns district. Much good might result, however, from individual collecting by canegrowers on land subject to annual invasion from grey-back beetles. Some years ago (1921) the present writer, when reporting on the value of two native figs, *Ficus pilosa* and *F. nesophila* (favourite food-plants of this cockchafer), suggested the advisability of planting these trees as natural traps, that would attract beetles away from the cane, and facilitate the collecting of same (Bulletin No. 17, page 64). Such trap-trees could be planted, say, about 600 ft. apart along headlands, and pruned occasionally to keep them low and induce spreading. *Ficus pilosa* has been successfully raised here from seed this season by the Assistant Entomologist, Mr. A. N. Burns, and we now have quite a number of plants, which twelve months hence will be young trees suitable for distribution.

It may be of interest to state that in Mauritius during the 1923-24 season 52,000,000 beetles of *Lachnosterna* (*Phytalus*) *smithi* were collected during the year. In one locality collecting these beetles by hand from cane-furrows considerably reduced the infestation. In the Phillipines during 1925, collecting by hand of the grubs of the cane beetle *Leucopholis irrorata* proved the best method of dealing with this pest, and is especially recommended in canefields where ratooning is rarely if ever practised. In the "Planter and Sugar Manufacturer" for July, 1925 (Volume LXXV., page 49), some interesting tables are given showing the numbers of grubs of *Lachnosterna* collected during the years 1918 to 1923, including the expenses and cost per hundred. "On referring to these tables it will be noticed," says Mr. E. H. Barrow, "that the numbers collected were decreasing up to the date when collecting was stopped, and began to decrease when collections were again taken."

Effect of Late Emergence of Beetles.

At the present time (13th May) grubs of *albohirtum* are still feeding vigorously in some localities, having only just entered upon the third instar. This means that grub injury may yet show up on plantations believed to have escaped infestation, seeing that these grubs will continue feeding until the end of June.

An emergence took place this season about 3rd January, instead of some time in November or December, as usually happens during normal seasons. Our only other record for January was in 1919 to 1920, when a primary flight occurred on the 15th of that month.

During 1918 these beetles made their first appearance on the 15th October, which was, of course, exceptionally early.

As previously reported (Bulletin No. 19, page 26) beetles forced to endure prolonged confinement for several weeks in underground pupal chambers are likely to suffer an appreciable loss of vitality, so that when at last able to escape from the soil they are unable to withstand a spell of excessive heat, and should such conditions chance to occur before oviposition while they are still in the feeding-trees millions of specimens may perish.

CANE PESTS AND DISEASES.

Mr. N. L. Kelly, Assistant to Pathologist, reports (24*th May*, 1926):—

Mosaic disease occurs in every canegrowing district of Queensland and New South Wales. Its spread in the past has been due to the fact that many growers do not know either its symptoms or the losses it causes, and thus do not attempt to control it.

Losses.—These losses are considerable. Every mosaic-infested set planted produces a stool which may be only half the weight of a healthy stool, in susceptible varieties, *e.g.*, Shahjahanpur 10, Gingila, and to a lesser extent M. 1900 Seedling. In other varieties grown, the loss is, generally, not so great, although one authority estimates 40 per cent. as the average loss. The loss in a ratoon crop, quite apart from the spreading of the disease, is usually larger than that in the plant crop.

Symptoms.—The first noticeable feature is the presence of a mottling on the leaves—patches of light-green or light-yellow alternating irregularly with patches of the normal darker green. As spots or streaks due to other causes often appear on older leaves, the mottling should always be sought on the younger leaves. By transmitted light these appear very translucent in the more unhealthy areas. In thoroughly infected shoots symptoms may also be seen on the stem. This is both shortened and marked with colourless longitudinal streaks, and, in badly affected cases, the internodes are contracted and "scored" longitudinally.

Cause.—The disease is caused by an ultramicroscopic organism—a virus. The lighter-coloured patches on the leaf—the more unhealthy areas—are the portions where the virus has partially decomposed the colouring matter of the leaf—the chlorophyll.

Spread.—Mosaic is spread by planting diseased sets.

Infection is carried by the corn aphis (*Aphis maidis*), which carries the virus in its mouth parts—(1) to healthy cane; (2) to the following grasses:—Corn, sorghum, Native sorghum, Johnson grass, Rat-tailed grass, Wild millet, and Summer grass, on all of which the corn aphis has been found, and all of which contract a Mosaic disease.

Control.—(1) Eradicate (dig out) infected stools from all lightly-infected fields. This operation is most efficiently performed when the cane is young, and quite prevents the spread of the disease. The nearer "ploughing out time" it is, and the more heavily infected the crop is, the less payable, of course, does eradication become.

(2) Seed selection.—Avoid, as a source of seed, any stool, one of whose stalks is infected; for the infection soon spreads from one to every stalk in a stool.

(3) Resistant varieties.—Eradicate very susceptible varieties, especially Shahjahanpur 10. Every stool of Shahjahanpur 10 that the writer has seen has been infected with Mosaic.

(4) Keep corn, and the above-named grasses as far from the canefields as possible.

DISTRICTS VISITED.

Bauple.

This district is not troubled very much with serious diseases. Gumming is present on a few farms. Eradication and seed selection alone should eliminate this disease. Mosaic is more widely distributed, and is causing losses in M. 1900 Seedling. This variety here, and elsewhere, is also troubled somewhat with Foot Rot (or Root Fungus disease or Peg Leg). Foot Rot can only cause damage when the cane is first weakened from some other cause, *e.g.*, drought, insect attack, incomplete preparation of the land, &c. The fungus attacks the cane from the soil, in which it has been living on rotting stools, &c. It can be largely destroyed in a field by careful tillage, and by a "green manure" crop; otherwise by long fallowing before planting.

Maryborough.

Gumming was found on a few farms in The Pocket. Fiji disease, which was described in the writer's last report, was recognized, for the first time in the district, at Tinana and Bidwell. Control measures are elaborated in the last report. The careful selection of seed must be practised until the disease is entirely eradicated. Mosaic is to be found on the majority of farms at Maryborough, Yerra, and Pialba, and always where Shahjahanpur 10 is growing or has been growing. This variety is for this, if for no other reason, to be strongly condemned. The Island Plantation appeared particularly free of disease.

Isis.

This district has just passed through one of the worst droughts in its history, consequently those farmers that are suffering most from diseases are often least able to eradicate them. Gumming disease was found at Goodwood, North Isis, Cordalba, and Horton in D. 1135. It is appearing in two stages:—

(1) In one-year old cane the "gum streaks"—streaks in the leaf—formed after the small quantity of rain at Easter-time are showing up well. They are probably that type of streak due to the bacteria rising with the sap from the infected vascular bundles of the stem. In any case, it behoves every farmer concerned to acquaint himself with these "gum streaks," as when they are showing, they are the speediest and most valuable means of identification known. Obviously, early identification tends towards economy in control.

(2) In two-year old cane gumming is now becoming acute, in most cases. This is brought on by drought and approaching maturity. The top of the stem has died, and the rot is advancing downward. The "eyes" near the top have shot. On splitting the stem vertically a reddening of the veins—vascular bundles—is noticed, which becomes less pronounced towards the foot. A segment cut from the top "sweats" gum readily. On the ends of segments cut from a lower portion of the stem it is very difficult to detect the gum globules. Gumming was not located in M. 1900 Seedling, but that variety is susceptible to the disease. Since the disease is scattered somewhat sparsely, eradication and seed selection, as previously elaborated, are sufficient measures for its control.

Mosaic disease is causing losses in all varieties grown. The reader is referred to previous remarks on this disease.

Foot Rot is highly prevalent, mostly in M. 1900 Seedling, but also in D. 1135, Q. 813, and H.Q. 285. Control measures are mentioned in the remarks on the Bauple district.

Iliau was found in one field of plant M. 1900 Seedling at Goodwood. It attacks only young cane. The leaf-sheaths are very tightly cemented to the stem by a white felt of fungus mycelium. On the outer side of the inner leaf-sheaths are to be found small eruptions, with black coiled masses projecting, which contain the fruiting bodies—conidia.

The showers now falling are washing these into the soil, so that next year's ratoons, from the uninfected stools nearby, will almost certainly be attacked, though the percentage of infected stools killed out will probably be smaller.

Control.—Plough out the infected and a small buffer area, and give the land thorough preparation before replanting.

Knife Cut was found in one-year old D. 1135, and to a much smaller extent in M. 1900 Seedling. According to the observations, over a period of ten years, of Mr. G. F. Schmidt, North Isis, in dry times a joint near the top becomes contracted. Soon after the return of better growing conditions a bulge appears on one side of this joint, followed shortly by the transverse break or cut on the other. One fact is almost established, that the faces of the wound were once in contact. Various theories as to the cause have been propounded but nothing has yet been proved.

Mr. R. W. Mungomery, Southern Assistant Entomologist, reports (*15th May*, 1926):—

During April Nambour, Beenleigh, Booyal, and Dallarnil districts were visited, and inspections of these cane areas were carried out.

Nambour and Beenleigh.

Diseases in cane call for greater comment and a much more serious consideration from growers at Nambour and Beenleigh than actual insect injury, and, without considering for the present the importance of insects as factors in the spread of Mosaic disease, and also in regard to their being suspicious agents in the spread of Gumming disease, any direct attack from insects and losses accruing therefrom must necessarily take a second place to the losses caused by diseases in these districts.

Maggots in "Dead Hearts."

When on the subject of the Gumming disease, it may not be out of place to add here, that in the final stages of this disease when the plant begins to die, the heart usually dies first and death then follows from the top downwards. When in this condition, if the dead central heart be pulled out it will be found to harbour several small long dipterous maggots in all stages of development, up to about $\frac{1}{2}$ inch in length, and sometimes their golden brown puparia may be found scattered through the rotting fibres. These maggots are, in many cases, often mistaken by farmers for the real cause of the death of the cane, but their presence in these dead leaves is purely of a secondary origin, the adult flies being influenced to oviposit here, by the attracting odour of the decaying vegetation. This state of affairs also happens in the case of "dead hearts" caused by injury of the large moth borer *P. truncata* and other similar insects, as well as from mechanical injury due to scarifiers and other implements used in cultivation.

These maggots are the larvæ of flies belonging to the Micropezidæ and other closely allied families, and the writer has bred specimens of these flies in North Queensland, and, although they may differ as regards species, the habits of those occurring in the South are essentially the same as the Northern species. Therefore, these maggots themselves should be of no great alarm to growers, but should serve as Nature's way of indicating that other factors are present which are causing or contributing towards the death of the plant.

Other Injurious Insects.

"White grubs" are causing minor damage in parts of the abovenamed districts, chiefly to young plants when they are first planted up in spring in land that has previously been under paspalum grass, but also in a few instances these grubs have been causing damage to young ratoons in the Rosemount area and a considerable reduction in tonnage has resulted. The identity of these grubs is unknown, but they are probably the larvæ of an Anoplognathid, and arrangements will be made as soon as possible to breed them out and to determine which beetle, out of the many scarabæidæ known to occur there, is responsible for their appearance in the canefields.

No soil fumigation tests have yet been tried and the only method of dealing with them that has proved successful in regard to the plant crop is to first plant up some

other crop such as arrowroot or beans which do quite well in these localities, to hand pick the grubs when ploughing these crops out, and to plant up with cane as usual in the following year. Carbon bisulphide should be used with discretion, preferably in very small quantities, for larger doses are apt to be too severe on the young plant cane, and in these moist swampy soils paradichlor would scarcely evaporate quickly enough to have any appreciable effect on the grubs, though the success that has followed its use in other places certainly warrants its being tried here. In the case of ratoon cane referred to above, this might well be treated with carbon bisulphide injected with a Dank's injector and produce no ill-effects on the cane.

P. furfuracea and *L. grata* were found on newly ploughed paspalum land at Kureelpa, but they are apparently not responsible for the damage they occasion in the Childers and Gin Gin districts.

A so-called "black beetle," which, according to its occurrence and the description given by various growers, may be *Pentodon australis*, has been eating the eyes of the sets and boring into the shoots just above their junction with the parent set. This injury is mostly confined to the newly planted paspalum lands and other cultivated lands adjoining these, resulting in bad "strikes." As very little ploughing was going on during the time of my visit, and none of these beetles were taken, I was unable to confirm the identity of this beetle.

Booyal and Dallarnil.

These districts are at present suffering severely from drought, and although at times like this, where actual injury from insects did occur, it would be hard to differentiate between the losses due to insect damage and that due to dry weather, it is safe to say that in this case where harmful insects are so noticeably absent, losses are solely due to the dry weather.

The Bud Moth *(O. glycyphaga)*.

These moths, whose larvæ injure the buds or "eyes" of sugar-cane, were rather plentiful resting in their characteristic attitude on the underside of the cane leaves, and growers should keep a careful watch on all cane used for plants, for in many cases the eyes are so badly bored into that they will not shoot, hence a bad "strike" often follows a careless selection of seed cane.

FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (20th May, 1926) from the Southern Field Assistant, Mr. J. C. Murray:—

Booyal.

The crops here are backward and the prospects for the coming season are not of the best. Much of the plant and ratoon cane made a good start, but there has been little growth since Christmas.

Regarding results from fertilising, behaviour of varieties, and losses due to parasitic agencies, there is nothing of importance to comment upon since last visiting this district.

Points that farmers should consider in making local experiment in regard to cane varieties are—

(1) Resistance of cane to grub attack, frosts, or disease.
(2) Root system, whether large and spreading or small and bunched.
(3) Nature of soil particular varieties thrive best in (this is an important point).
(4) Nature of soil whereon canegrowing appears to suffer most from gumming disease, if present.
(5) Striking, stooling, and ratooning qualities.
(6) C.C.S. content.

Dallarnil.

This district has suffered a great deal from the dry weather. A very considerable amount of effort has been put forth by the growers in Dallarnil, and it is unfortunate that they should have encountered such a dry spell this year. However, if they do not take a heavy tonnage off, there should be a heavy crop for the following season.

Farmers here during the next planting period are recommended to be careful in plant selection, and not use disease-affected sets.

Bundaberg.

This important sugar centre is at the present time, from a sugar-growing viewpoint, backward through not having had sufficient rain since Christmas. The crops are green, however, and the farmers have had good results from their recent planting operations, while the general outlook is not altogether unpromising either for the coming season or for 1927.

Regarding cane varieties, those making a good showing are M. 1900 Seedling, H.Q. 285, N.G. 40, N.G. 22, Q. 813, H. 227, and Black Innes. The latter cane is suffering a good deal from Mosaic disease. Gumming disease is in evidence, though more advanced in Clark's Seedling than other canes.

The following field observations were made with regard to the gumming of sugar-cane:—

(1) That yellow shotty soils or soils with clay subsoils have a larger percentage of gum-carrying cane than red volcanic.

(2) That a large percentage of soft-skinned canes "gum" readily.

In relation to manures, growers are obtaining further positive results from the use of potash. In regard to the use of this manure, it is not altogether advisable to use it alone, but mixed with other manures. Potash should be used as an auxiliary rather than a sole manure.

There is a considerable amount of circumstantial, though not conclusive, evidence to show that potash has a harmful effect on earth parasites, such as wire worm, snails, &c.

The following descriptions of varieties about which there is some doubt may be of use to farmers in this district:—

N.G. 40.—A bright green cane with claret-purple longitudinal lines and stripes, internodes about 4 in. long; good stooler. Not known to arrow.

N.G. 40 Sport.—A green-coloured cane of medium thickness with a red to brown blush; internodes from 3 to 4 in. long and barrel-shaped; erect habit; good stooler and free trasher. The Sport is not such a good cane as the original N.G. 40.

N.G. 103.—Olive-green coloured cane, with light red stripe, medium thickness, heavily waxed, erect habit, internodes 3 to 5 in. long, barrel-shaped; eyes medium and acute; foliage medium; good germinator and stooler; arrows.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (22nd May, 1926) from the Northern Field Assistant, Mr. A. P. Gibson:—

Innisfail District.

Goondi, Mourilyan, and South Johnstone Sugar Mill areas were inspected last month. Last season 64,299 tons of sugar were manufactured in the Johnstone River sugar district. The Adelaide Steamship Company's mosquito fleet speedily removed all with the exception of 18,369 tons; this was taken away from Mourilyan Harbour by larger boats.

Seasonal.—Up to the fourteenth day of April splendid rains fell, and since, warm dry days followed by refreshing nights have been experienced.

Rainfall.—January, 13.93 points; February, 8.51; March, 17.43; April, 13.76; to 15th May, .88; total 54.51. The total fall to date is much below the general average, although enough to maintain crop growth. Should the winter be cold, and the rainfall scanty, the estimates given below will not be realised.

Crop Prospects.—At present, the crop is looking well, but in parts backward, the average length of stem would be from 3 to 4 ft. and carrying a lengthy top, therefore making it difficult to determine with any degree of certainty the district's grand total tonnages likely to be harvested. Unforeseen things such as weather, early arrowing, and pests may have a beneficial or detrimental influence on the present hopeful conditions.

Approximate Mill Estimates.		Commencing Crushing Dates.
Goondi	155,000	16th June.
Mourilyan	135,000	27th May.
South Johnstone ..	210,000	12th May, now delayed to 19th May.
Tully	135,000	1st July.
Estimated total tons	635,000	

Cultivation.—Ideal conditions prevail for all classes of outside work. The cultivation of crop interspaces was being continued on the more recently planted areas and backward ratoons. Light animal-drawn implements in use were making little impression in some of the refractory soils; such cohesive interspaces would be more profitably tilled by the use of a subsoiler, thereby permitting access of the two essentials—water and air—necessary for quick and healthy growth. Many motor and animal-drawn ploughs were engaged turning in satisfactory leguminous crops, and preparing the resting areas preparatory to the coming planting operations. In some instances the resulting work was poor, the cut is sometimes too wide, leaving under the surface a great unploughed ridge. It is common to find the supposed ploughed out old stubbles of a previous crop growing strongly in the subsequent plant area. The D.I. plough is becoming popular, more especially for the turning in of vegetable matter.

Planting.—Several farmers were planting, the foremost idea being to have this operation completed prior to harvesting operations. Some paddocks would have benefited had they been ploughed again before planting. The practice of opening cane drills too far in advance when planting should not be encouraged. Cane considered too expensive to cut by the harvesting gangs is often invariably retained for plants. Nothing but the best and disease-free should be planted.

Varieties.—Many varieties are raised, the most favoured and profitable all-round cane is N.G. 15 (Badila); this should be grown on the good to medium soils, and 7 R 428 (Pompey) and Q. 813 on the poorer soils. On the richer lands they should be classified among the disapproved varieties. Here the growth is too rapid and the cane tumbles, resulting generally in a low commercial cane sugar content.

Isolated patches of cane, more particularly that growing on volcanic red soils, fail to grow cane in comparison with the average crop. Such patches after harvesting often develop yellow stripe in the leaf quite distinct from Mosaic disease. This may be due to the absence of chlorophyll, or something harmful in the soil. Soil samples of the good and the bad were taken for the purpose of finding the reason why, and what to apply.

Arrowing.—The season, the variety, and time of planting mainly influence arrowing. The first indication of this was observed in the variety 7 R 428 (Pompey) on the fifth day of April. Since, all varieties have speared, N.G. 15 (Badila) at present to a much lesser degree. Fully developed flowers were showing a month later. During the next two weeks fully developed flowers will be plentiful when the growth of this cane will cease.

Leguminous Crops.—Mauritius beans and cowpea are mainly grown for the purpose of helping restore the depleted soil humus. The former mentioned is a slower maturer, and is more difficult when old, to plough under in the friable red soils. Rice beans—a recent introduction—have given promising results in the experiment stages. A small area of this and Mauritius bean were sown side by side, at the end of February, 1925, for comparison; the latter was completely destroyed during the prevailing wet conditions early in its growth, whilst the rice bean flourished and produced a satisfactory crop of green matter, maturing in June. At present a crop of the aforementioned two crops were seen growing side by side on a Goondi farm; the rice bean in every respect appeared superior to the Mauritius bean, and was heavily covered by a buttercup yellow flower. Small areas had been carefully measured and the surface crop weighed, with the following results:—Mauritius beans at the rate of 7½ tons vegetable matter per acre; rice beans at the rate of 15 tons vegetable matter per acre.

Cane grubs.—Isolated patches of cane throughout this extensive district have suffered more or less from the cane grub destruction. Garadunga and Daradgee volcanic red soils, and the alluvial deposits at 8-Mile, South Johnstone, were the worst affected. Three distinct types of larvæ were located under the devoured cane stools, clearly indicating three flights of the mealy bug. The estimated cane tonnage destroyed by the pest at Goondi last year alone was 6,000 tons, this year it is greater and could easily be put down at 15,000 tons for the district. Fumigants have been used in the soil, opinions differ very much regarding its successful use or otherwise. Two farmers at Daradgee were picking up at the rate of two and a-half kerosene tins of grubs per man per day, for which 6d. per pint and 1s. per lb. for beetles was being paid. Green Muscardine fungus, one of the grub parasites, was observed covering many larvæ exposed by the ploughs in the Mourilyan alluvial soils. Unfortunately, farmers were picking up the affected grubs, therefore freeing the soil of this valuable vegetable parasite.

Some action should be taken to stop people shooting the sugar-farmer's friend, the "Ibis."

The weevil beetle borer (*Rhabdocnemis obscurus*): This notorious pest is spreading at an alarming rate, more especially in the South Johnstone area. If not speedily controlled may cause most serious losses, more especially in the softer rind varieties. To retard its progress, it is urgent and important that we speed up the breeding of the Tachinid fly—one of its present known and most valuable parasites. At Silkwood some 2 ft. of badly-decayed stem of 7 R 428 (Pompey) were examined, and found to contain 30 beetles, 22 larvæ and 9 cocoons, three of which fortunately contained eggs of the Tachinid fly. Eggs of this parasite were also located on a farm at Jaffa. Many cocoons in the South Johnstone area were examined, all of which contained larvæ all the way up from the pupating stages to the fully-matured beetle. Cane recently trashed along the railroads for fire breaks was being severely attacked by the borer.

Diseases.—Leaf scald and a fungus on N.G. 15 (Badila) were observed, the latter tightly binds the embracing leaf-sheaths to stem, thus causing a sickly light-red colour and reducing the sugar content. When this leaf is removed the cane, on exposure to sunlight, quickly regains its dark colour. On no account should such affected canes be used for seed. The mill chemists are busy testing canes prior to commencing grinding operations; the sugar content of same is turning out quite satisfactory considering the time of the year.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (18th May, 1926) from the Southern Field Assistant, Mr. E. H. Osborn:—

During the past four weeks the Mackay area was visited, more attention, however, being paid to the North side areas than elsewhere, although some time was also spent on portions of the Racecourse area, and a few brief visits were paid elsewhere.

With regard to the cane generally, it had not had sufficient moisture to enable it to make its best growth, and was, although green and healthy looking, rather backward. This applies especially to the plant. As for the ratoons, they looked fair where they had been well cultivated, but very poor in many other cases, the ground being very hard in the interspaces and the weed growth heavy.

Referring to weather conditions, the following rainfall was registered at the Mackay Post Office:—January, 3.40; February, 4.05; March, 8.10; April, .90; May (to date) .19; total 16.64 in. This gave a total of 16.45 for the first four months of the year, against 33.57 in. for last year, 34.57 in. being the average fall for the past five years in the same period, so naturally the crops have felt it.

In speaking of cultivation to many growers, remarks were made by some of them that, with sugar at such a low price, they could not afford to cultivate as well as they wished. That is certainly so if a grower is trying to cultivate too large an area, but it cannot be denied that the small well-farmed area pays much better, in proportion, than the larger one yielding only a very medium crop, for in the latter case the savings in cultivation costs are probably balanced by the extra cost of harvesting light and weedy cane, together with the loss of humus to the cane caused by the certainty of having to burn such crops.

Regarding the probable loss by such burning, an interesting investigation into the yield and analyses of cane tops and trash was carried out at the Colonial Sugar Refining Company's Broadwater Mill, Richmond River, New South Wales, I understand, in 1923, and the results indicated that the trash and tops from a good crop (plant) of Badila may contain several times as much humus and probably as much nitrogen as a good crop of cowpea or bean.

Considering how many years the majority of the local lands have been growing cane it will be seen how important it is to plough all tops and trash in, whenever possible.

Throughout the areas visited, a fair amount of planting had been carried out (but not as large an area as is general at this period) with a very fair strike—several very nice blocks of young Badila and Q. 813 being noticed. Large areas were, however, being got in readiness for later planting.

In reference to late and early planting, the following information taken from the Director's last year's annual report may be interesting to those growers who may not have seen same. Five each of early and late canes were tried out. The land was ploughed and planted with cowpea in December, 1923, the latter ploughed under in March following, ploughed again in May, ploughed and subsoiled to a depth of

19 in. at the end of June, whilst the final ploughing was given early in August, and the planting on the 11th of that month. In October the canes were all fertilised with the following mixture:—

Sulphate of ammonia	100 lb. per acre.
Nitrate of soda	100 lb. per acre.
Sulphate of potash	75 lb. per acre.
Meatworks	300 lb. per acre.

followed by a top dressing of 50 lb. of nitrate of soda and 50 lb. of sulphate of ammonia per acre during December.

EARLY MATURING VARIETIES.—SEPTEMBER.

Cane.	Age Months.	Tons Per Acre.	Per cent. of C.C.S. in Cane.	Yield of Commercial Cane Sugar per acre in English Tons.
D. 109	13	45·1	12·92	5·82
H.Q. 285	13	32·6	15·48	5·04
H.Q. 426	13	46·5	16·33	7·59
E.K. 28	13	47·7	17·02	8·12
Q. 813	13	48·4	16·58	8·02
LATE MATURING VARIETIES—NOVEMBER.				
N.G. 24 Goru	14½	42·2	14·28	6·02
M. 1900	14½	41·9	16·60	6·95
7 R 428 (Pompey)	14½	47·3	14·84	7·01
N.G. 15 (Badila)	14½	41·8	16·99	7·10
Cheribon	14½	49·3	14·33	7·06

Thus the early canes gave an average tonnage per acre of 44 tons, with an average yield of sugar per acre of 6.91 tons, against the late canes' average of 44.5 tons per acre and an average sugar yield of 6.82 tons.

Cane Varieties.—A large number of varieties are grown in the Mackay area, of which the principal varieties are M. 1900, Q. 813, Malagache, D. 1135, Black Innis, H.Q. 426, N.G. 15 (Badila), Cheribon, 7 R 428 (Pompey), E.K. 28, H.Q. 285, and several others in lesser quantities. Q. 813 and M. 1900 still continue to give great satisfaction as regards density, the latter unfortunately suffered from Red Rot last year to a certain extent. 7 R 428 (Pompey) was looking very well in various parts of the district, and seems to be a cane capable of giving good tonnage and density, in poor to medium ground, if cut at the right time of the year. A plot of first ratoons of this cane cut between 17th and 30th of November gave a tonnage of 40 tons per acre and an average c.c.s. of 16. The ratoons now look good enough for a 30-ton crop if cut late.

Some splendidly vigorous looking E.K. 28 was also noticed growing upon the station, having only been planted in September. In several parts of the district good plots of this cane were growing, an especially good stand being noticed upon the farm of Mr. P. C. Brooks, near Sarina. In speaking of this gentleman it might be mentioned that he is trying out an experiment in using some 70-80 tons of molasses per acre upon a paddock, corn was subsequently ploughed in, and the land will be planted in or near August next. At this farm experiments in cassava are being carried out; some sixteen or seventeen different varieties were noticed. Probably some 100 growers have an average of 1 acre each of this crop.

Cane Diseases.—Mosaic is certainly the most common disease in the district, but the writer did not see as much as he had expected to. It was noticed in H.Q. 426 ratoon, D. 1135 ratoon, Shahjahanpur No. 10 ratoon, Badila plant, Malagache plant, H.Q. 426 plant, and Q. 813 plant. Leaf stripe or "Downey Mildew" was noticed in B. 147 plant and E.K. 1 ratoons. Red Rot was noticed in H.Q. 426, M. 1900, and Innis. Gum was noticed in one case in H.Q. 285 ratoons.

Wire Worms.—Damage from same had not been very serious up to then, in fact, only a very few growers had experienced loss from same.

Grubs were bad in a block of second ratoon D. 1135 and old ratoon Uba, both in the Farleigh area.

Moth and Beetle Borers had also caused very minor damage in odd places.

"BUNCHY TOP" IN BANANAS.

FINAL REPORT OF INVESTIGATION COMMITTEE.

Far-reaching recommendations, including proposals for joint legislative action by the Governments of Queensland and New South Wales, to ensure the policing of the banana-growing areas affected by bunchy top, the destruction of affected banana plants, the registration of all banana, plantain, and Manila hemp plantations, and the destruction of all backyard or garden banana plants in unregistered places; restrictions on the transport and sale of banana suckers and the imposition of various other responsibilities on the Governments and the growers for the control and eradication of bunchy top, are contained in the final report of the committee of investigators into the occurrence of this plant disease in Australia.

"It has been definitely proved that bunchy top is a disease transmitted from diseased to healthy plants by the banana aphis."

"Measures serving for the exclusion of the bunchy top disease in bananas from unaffected areas or from plantations in lightly affected areas, and measures for the eradication of the disease from heavily and lightly affected areas, represented the only means available for controlling bunchy top."

These are the final conclusions of the committee consisting of Professor E. J. Goddard (Supervisor), C. J. P. Magee (Assistant Plant Pathologist), and H. Collard (Horticulturist). Their report is made to the Bunchy Top Board of Control by which they were appointed, and which now consists of the following members:—Professors E. J. Goddard, B.A., D.Sc. (University of Queensland), R. D. Watt, M.A., B.Sc. (Sydney University), and F. G. B. Osborn, D.Sc. (Adelaide University), Messrs. E. Graham (Under Secretary for Agriculture, Queensland), G. D. Ross (Under Secretary and Director of Agriculture, New South Wales), and G. Lightfoot (Acting Director of the Commonwealth Institute of Science and Industry).

Conclusions.

Consequent on the foregoing decisions, the investigators have concluded:—

"That no protectionary measures are available.

"That no resistant or immune banana stock is available.

And "that no remedial measures are available."

But they make comprehensive recommendations, the efficient discharge of which by all concerned, together with the continuous full co-operation of the growers and of the various societies and associations and other bodies interested in banana-growing, will, they consider, result in the restoration of the industry in heavily affected areas to its former status.

Recommendations.

These recommendations are as follows:—

(1) Until such time as it can be declared that any particular district is free from bunchy top, the shifting of suckers in any part of Queensland should be prohibited; after receiving a clean certificate the embargo could be lifted in any district, which would then be protected by the observation of the other recommendations made.

(2) Prohibition of the transportation of any vegetable portions of any banana plant (or any member of the genus Musa) from any part of the areas affected with bunchy top to any area not affected with the disease or to any lightly affected area.

(3) Prohibition of the shifting of suckers of banana plants (or any species of the genus Musa) from any plantation within a lightly or heavily affected area to any other plantation within that area.

(4) No person should be allowed to trade in suckers or to transport suckers from any plantation in New South Wales or Queensland to any other plantation in either State, unless, after receipt of a statutory declaration from the person concerned to the effect that bunchy top has never been detected in the plantation from which suckers are to be obtained, a special permit has been granted by a competent official; and, further, no such permit should be granted unless the plantation from which suckers are required, as well as those plantations immediately surrounding it, has been examined by the official not more than fourteen days previously, and it has been proved that bunchy top is absent, and has never been present in any, or all, the plantations.

(5) The immediate destruction of all banana plants (or any member of the genus Musa), in backyard or similar gardens, that is, in other than registered banana plantations, and the prohibition of the growing of these plants in such gardens.

(6) Registration of all plantations in which any species of the genus Musa (banana, plantain, Manila hemp), is cultivated, throughout Queensland and New South Wales.

(7) Immediate destruction in any plantation of every stool in which any portion or plant has shown symptoms of the disease in any lightly affected area; in such cases where the disease becomes very strongly developed, or in lightly affected plantations in specially located areas, which call for special consideration, all plants to be destroyed.

(8) A systematic examination by the grower, at regular intervals, of all stools in a plantation in any lightly affected area or unaffected area.

(9) Bunchy top should be made a notifiable disease in any area not so far known to be affected with the disease, or in any plantation which has been apparently free from the disease as late as the legislative enactment of these recommendations.

(10) Prohibition of the transport of banana fruit from any affected area to the unaffected area north of the affected area, or out of any affected zone in which the disease appears at any time, to any unaffected zone.

(11) Illustrated lectures and practical demonstrations of an educational nature throughout the banana-growing areas with a view to enabling growers to identify the disease at the earliest possible stage; and distribution of a clear, concise, and fully illustrated pamphlet indicating the symptoms of the disease, the manner in which it is distributed, and the combative methods recommended.

(12) A systematic inspection of banana plantations throughout Queensland and New South Wales should be undertaken for the purpose of gathering all available information in respect of the condition and history of the plants; and immediate attention should be given to the plantations situated beyond the affected areas, but which have received suckers within the past few weeks from areas now known to be affected.

(13) All deserted plantations in existence should be eradicated within a definite period after the legislative enactment of these recommendations.

(14) All affected plantations should be cleaned up within a definite period after the legislative enactment of these recommendations.

(15) Owners should be liable for harbouring affected plants after the expiration of that period.

(16) After a further definite period from the legislative enactment of these recommendations, consideration should be given to the matter of the complete destruction of all banana plants throughout the affected areas, or in certain plantations bearing unfavourable reports within those areas, and the prohibition of planting-up for an indefinite period in such areas or plantations.

(17) Growers should be dissuaded from planting-up within the known heavily affected areas until such time as an official statement intimates that such procedure offers reasonable chances of success, or until such time as the cleaning-up of the affected area has been completed.

(18) Immediate destruction of all affected stools in any plantation in any area from which bunchy top has not been reported prior to the legislative enactment of these recommendations; in such cases where the disease becomes very strongly developed, or in lightly affected plantations in specially located areas, which call for special consideration, all plants to be destroyed.

(19) It should be made compulsory on the part of the owners to complete the destruction of all banana plants on land which has passed out of systematic cultivation, and so prevent the persistence of deserted plantations.

(20) A Government nursery should be set up in some part of Queensland that is free from bunchy top and beetle borer, for the supply of reliably healthy suckers at a reasonable price.

Legislation Suggested.

(21) A most serious effort should be made by the Governments and growers concerned, in the different discharge of these recommendations, with a view to hastening the eradication of the disease, and thereby restoring the industry to its

former status as quickly as possible, and preventing the spread of the disease. With this object, the following suggestions are submitted for consideration:—

(*a*) Where the necessary powers are not available under present enactments, the Governments concerned should legislate as quickly as possible, and it is desirable that such legislation should, as far as practicable, be on the same basis in Queensland and New South Wales.

(*b*) The necessary machinery should be devised by the Governments of New South Wales and Queensland for giving effect to the regulations, controlling the problem of eradication, and intensifying the educational aspects.

(*c*) Provision should be made for an adequate staff of competent inspectors who should be provided with motor transport facilities.

(*d*) As the further investigation of certain aspects of the bunchy top problem is contemplated, the results of which will be submitted to the Bunchy Top Control Board, from time to time, in reports from the supervisor, it is desirable that there should be the fullest co-operation between that body and the State Departments concerned.

(*e*) A definite effort should be made to enlist the co-operation of the various societies or associations interested in banana-growing.

(*f*) Consideration should be given by the Governments concerned to the means of dealing with the difficult problem of heavily affected or deserted plantations, such as making provision for funds for eradication by means of a monetary advance against the land, to be redeemed within a certain number of years, or by means of a levy on the industry—on an acreage or production basis—assisted or unassisted by a Government contribution.

Distribution of the Disease.

The report refers in detail to the huge losses which the disease has inflicted in New South Wales and Queensland.

The investigations carried out had not shown any plant, other than a member of the genus Musa, as a positive host of the bunchy top disease. All varieties of the banana grown in Australia were susceptible to bunchy top. The chief and only commercial variety of banana grown in North-Eastern New South Wales and Southern Queensland was the cavendish (Musa cavendishii). This dwarf variety was very susceptible to bunchy top, but appeared to be the only variety which could be grown profitably in these districts on account of climate and windy situations of plantations.

Bunchy top has been transmitted to healthy Manila hemp plants under glass-house conditions at Tweed Heads. Attention is directed to the danger presented by any possible transmission of the disease to the indigenous species of the banana which grow in the dense scrubs of the North.

Bunchy top had a comparatively wide distribution among banana-growing countries. In Australia the disease was well developed in North-Eastern New South Wales and South-Eastern Queensland, and was present also in isolated centres of the banana areas of North Queensland. As infested suckers were sent from Queensland during 1925 to the North Gascoyne district of Western Australia, there was little doubt that the disease was also present there.

Transmission by Aphides.

Turning to the transmission of the disease by an ultra-microscopic agent—the banana aphis (*Pentalonia nigronervosa*)—the report said that its spread in Australia was due primarily to the propagation of infected suckers over wide areas, and then to natural transmission by aphides. There was evidence available that the soil, apart from its harbouring of infective aphides for a limited period, did not become infected. As attempts to transmit the disease by direct sap-inoculation had so far met with failure, it would appear that the disease could not be spread by infected implements during cultural and harvesting operations, such as the pruning of suckers and the cutting of bunches.

Aspects of the Problem.

The investigators pointed out that, in considering the matter of control, they have kept in view two distinct aspects of the bunchy top problem:—(1) That concerned with the conservation, as far as practicable, of the industry in the affected area, and the problem of bringing the industry in the same area back to its original status, as well as the resuscitation of the industry in those portions

of the area where it had become moribund; and (2) the protection of the large area in Queensland which was in no way affected with the disease.

The exclusion of the disease from any area could be effected, provided that none but healthy suckers were imported into that area, and that the area was sufficiently remote from any affected plantations to remove the possibility of migration or transportation of infected aphides.

No reliance could be placed on any apparently healthy plants taken from plantations in which bunchy top had ever appeared, as it so often happened that the disease might possibly be latent, or might not have developed to the symptomatic stage at the time when the plants were under observation. The only areas which could possibly be regarded as free from bunchy top in Queensland were those lying south of the Innisfail district and north of the latitude of Yandina. The disease was now known as a very light infection in two plantations in the Innisfail district, one plantation at Yandina, in a plantation at Beerwah, and several other plantations not so far north of the Caboolture River. As suckers had been sent out from an infected area to all parts of Queensland as far north as Innisfail, even at a recent date, suspicion of a wider area of infection must be considered.

Transport of Suckers.

A proclamation forbidding uncertified transport of suckers had been adopted by the Queensland Government, and it was necessary on the growers' part to secure suckers from such areas in Queensland as could be definitely pronounced free from bunchy top by the authorities of the State.

The regulation preventing the exportation of suckers from the affected area to northern areas must not only be most rigorously discharged if the northern area was to be kept free from the disease, but every effort should be made to have all possible links between the two areas eradicated.

A prohibition of the sale of suckers in any area except under the restrictions mentioned should be effected in order to exclude the disease from healthy plantations in any lightly affected area and to assist in overcoming any appearance of the disease due to the accidental transportation of diseased suckers into a healthy area.

The discovery of the disease in a garden at Auchenflower, a northern suburb of Brisbane, suggested very clearly that a definite method of procedure was imperative in dealing with the casual cultivator of banana plants. The disease by such household backyard cultivation might be spread throughout the Greater Brisbane area, which was a connecting link between the areas to the north and south of it.

Thus all banana plants or any member of the genus Musa, in all backyard gardens in Queensland, should be destroyed at once and the growing of such prohibited.

Frequent Inspection Necessary.

In carrying out the recommended periodical—preferably weekly—examination of each plant in each stool, the growers should pay careful attention to the last leaf in each plant and observing whether there was any trace of the characteristic broken dark green streaks in the leaf-blade, as described in the recently issued bulletin.

The investigators condemned the practice of leasing land for banana-growing to illiterate aliens.

Special attention was given to the possibilities offered by the use of sprays, dusts, and various specifics, but the results did not indicate that spraying was an effective method of control.

Thorough Eradication the Real Solution.

The thorough eradication of all stools affected with bunchy top appeared to be the real solution of the problem. In view of the manner in which the infected plantations were distributed, they considered that the Government of Queensland should endeavour to fight the disease by ensuring the extermination of the disease in the Innisfail district, instead of devoting merely general attention to all the affected areas. They recommended that the Queensland Government should undertake the responsibility of destroying all the plants in any infected plantations in the Innisfail area. As the infected plantations were very young, the growers should suffer no serious loss, and the financial obligations of the Government should not be very great. This would probably ensure the future existence of the banana industry in the North. As only isolated plantations, as at Yandina and Beerwah, and in certain areas to the South, had recorded the disease, it would be good procedure to

destroy all plants in any affected plantations at Yandina and Beerwah. Elsewhere, in areas where the disease occurred with greater frequency, the question of financial aid would, perhaps, be too serious, and, provided the regulations were discharged, there would seem to be no great merit in enforcing the destruction of all apparently healthy plants in an affected plantation.

Regarding remedial measures, the report held that reputed remedies were valueless.

Further Investigations.

Comprehensive researches would continue to be carried on at the Queensland University under the present supervisor.

The appendixes, among other matters, deal fully with the various operations at the experimental plots, with Mr. Collard's visit to Fiji, and to experiments with Fijian plants, and with poisons.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING APRIL, 1926 AND 1925, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April, 1926.	April, 1925.		April.	No. of Years' Records.	April, 1926.	April, 1925.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	4·39	25	2·17	5·07					
Cairns	12·15	44	8·71	9·57	Nambour	5·38	30	5·57	4·07
Cardwell	9·66	52	3·90	4·13	Nanango	1·76	44	1·56	0·23
Cooktown	9·09	50	6·50	6·64	Rockhampton ...	2·27	39	0·80	0·19
Herberton	4·21	39	1·34	3·82	Woodford	4·10	39	3·47	2·05
Ingham	8·65	34	1·82	2·96					
Innisfail	21·39	45	13·76	20·69					
Mossman	10·42	13	3·96	11·74					
Townsville	3·74	55	0·03	0·04	*Darling Downs.*				
					Dalby	1·20	56	1·38	0·04
Central Coast.					Emu Vale	1·15	30	1·14	0·08
					Jimbour	1·20	38	0·91	...
Ayr	2·79	39	...	...	Miles	1·30	41	0·53	...
Bowen	2·88	55	...	0·40	Stanthorpe ...	1·64	53	0·56	0·29
Charters Towers ...	1·72	44	...	...	Toowoomba ...	2·38	54	1·39	0·31
Mackay	6·67	55	0·90	1·79	Warwick	1·60	61	0·34	...
Proserpine	6·45	23	1·10	3·01					
St. Lawrence ...	2·79	55	0·26	0·68	*Maranoa.*				
South Coast.					Roma	1·23	52	0·17	...
Biggenden	1·80	27	1·59	0·35					
Bundaberg	2·87	43	0·76	0·56	*State Farms, &c.*				
Brisbane	3·56	75	2·36	0·98					
Childers	2·51	31	2·32	0·66	Bungeworgorai ...	0·78	12	0·21	...
Crohamhurst ...	5·70	30	6·17	2·42	Gatton College ...	1·53	27	1·28	0·10
Esk	2·55	39	3·65	0·77	Gindie	1·14	27	...	...
Gayndah	1·31	55	0·30	...	Hermitage ...	1·18	20	0·59	...
Gympie	3·13	56	2·65	1·21	Kairi	4·93	12	3·30	5·34
Caboolture	3·90	39	4·26	0·94	Sugar Experiment Station, Mackay	5·16	29	1·12	1·69
Kilkivan	2·03	47	0·52	0·04	Warren	1·31	12	0·75	...
Maryborough ...	3·40	54	4·68	1·72					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for April this year, and for the same period of 1925, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Meteorologist.

ABSTRACTS AND REVIEWS.

All foreign agricultural intelligence in this section, unless otherwise stated, is taken from "The International Review of the Science and Practice of Agriculture" and "The International Review of Agricultural Economics," published at Rome by the International Institute of Agriculture.

Hail Insurance.

"La Bulgarie," Third Year, No. 735, Sofia, 16th December, 1925.

Hail insurance was introduced in Bulgaria by the law of 26th December, 1911, and is based on voluntary co-operation. In 1912, the first year in which the law was applied, more than 17,000 farmers insured their crops against hail. In 1915 the number had doubled, and in 1917 it reached more than 38,000. After this date, however, hail insurance entered upon a period of unexpected decline, the reasons of which are by no means clear. In 1922 the number of farmers who had insured their crops against hail fell as low as 7,713. But from this date the number began to increase, and in 1925, after changes in the managing staff of the Central Co-operative Bank of Bulgaria, which undertakes this class of insurance, it reached 25,400.

The following table gives precise information regarding the development of hail insurance in Bulgaria:—

Years.	Number of Policy Holders.	Total Sums Assured.	Premiums.	Compensation Paid for Damage Caused by Hail.
		Leva.	Leva.	Leva.
1912	17,548	28,255,390	630,799	1,037,726
1913	25,026	39,326,400	921,182	869,761
1915	35,552	41,742,945	1,326,357	1,227,235
1917	38,765	65,537,950	2,114,135	934,684
1918	34,304	86,450,740	2,862,874	2,349,077
1919	31,064	123,316,620	4,805,292	4,155,393
1920	12,273	60,824,470	3,082,258	3,965,251
1921	9,467	74,622,260	3,459,879	2,974,103
1922	7,713	141,546,120	5,048,284	6,029,895
1923	8,739	155,398,920	5,781,805	6,101,283
1924	13,548	186,557,150	9,134,441	4,900,931
1925	24,500	386,199,560	14,425,954	9,000,000

(A leva is worth about 9½d.—Ed.)

The new law on agricultural insurance, passed by the Chamber in 1925, which made considerable improvements in the system by granting effective State-aid to the societies for the mutual insurance of crops, has greatly contributed to the striking increase in this class of insurance in 1925. This new law provides for the organisation of insurance not only against hail, but also against frost, drought, and floods.

Compulsory Hail Insurance.

Assicurazione obbligatoria contro i danni della grandine. Bill brought in and communicated to the Presidential Bureau, 15th November, 1925. Chamber of Deputies, Session 1924-25. Parliamentary Proceedings, Italy, No. 616.

The development of hail insurance in Italy has not been in proportion to the area under cultivation nor to the variety in the crops, the frequency of the phenomenon and the serious nature of the resulting damage (1). At the present time the limited number of insured persons tends to keep up the premiums and the high rates charged in their turn act as a deterrent, and the current view is that for certain crops and in many regions there is no advantage in taking out hail insurance. As a way out of this deadlock, Signor A. Maresealchi, who had already on several occasions in recent years called the attention of the Government to this important problem, introduced into Parliament on 15th November, 1925, a legislative proposal, with which other deputies were also associated, for "compulsory insurance against

damage by hail (assicurazione obbligatoria contro i danni della grandine).'' The extension of this scheme to the whole of Italy with its varied configuration, its great variety of soil characteristics and of crops, and the obligatory adherence of all agriculturists is the best way, as Signor Marescalchi remarks in the report which accompanies the proposal, to surmount the main difficulty, which is that of keeping the rates of insurance low so as to bring the advantages within the reach of all, while arranging a convenient scale of premiums according to the prevalence of hail storms and the crops of the different regions.

By the terms of the Bill all agricultural products must be insured, with the exception of those for which this precaution is not usually necessary; the undergrowth of forests, and pasture and meadow growths, &c. The insurance must be made by the owner of the land, or by the holder in emphyteusis or usufruct or by the tenant, and in each case at such person's expense. When, however, the land is held on a produce sharing tenancy, in which the produce is equally divided between the landowner and the tenant or on any other form of share tenancy, the owner, holder in emphyteusis or usufruct, or tenant has the right to claim from the share tenant so much of the premium as is proportionate to the share of the farm produce which falls to his lot.

The insurance may be made by private societies or companies which are already engaged in this branch of insurance, or by any societies that may have been empowered to do so in accordance with the terms of the law of 17th April, 1925, No. 473, and with the special regulations which will be issued. Authorisation may also be given for the formation of local insurance funds as between the farms of certain districts, on the understanding that such farms represent at least 300,000 hectares of cultivated land. The object of fixing this minimum area of insurance is to prevent the formation of small insurance societies, with no solid basis, which, owing to the insufficiency of their funds, can only be a source of disappointment to farmers.

It will be seen that State monopoly is excluded. The State is merely called upon to supervise and control the methods employed, and institutions which have the required qualifications of sound organisation are free to undertake the insurance. The proposer of the measure is of opinion that in this way the payment of the premium will be a less heavy burden on the farmers and he would also allow societies, both national and local, to federate and make use of reinsurance.

Under the Bill fines from 500 to 10,000 liras are imposed for non-observance of conditions. (1) According to a recent publication of the Ministry of National Economy (''Gli istituti e le imprese di assicurazioni private in Italia nell'anno 1923'') hail insurance is provided in Italy by thirty-three Italian companies, twenty-six both for insurance and reinsurance and seven for reinsurance only, and also by two foreign companies which arrange both insurance and reinsurance.

DESTRUCTION OF THE KHAKI WEED.

By C. T. WHITE, Government Botanist.

Many persons are much alarmed at the spread of this pest on the Downs and some other parts of Queensland.

The Khaki Weed (*Alternanthera achyrantha*) is a native of South America, and was introduced into South Africa in fodder from the Argentine during the time of the Boer War, and from South Africa it is thought to have made its way to Australia. Since its introduction to Australia it has steadily increased until it has become one of the worst weed pests. In 1918 an officer of the Department of Agriculture and Stock, Mr. F. B. Smith, B.Sc., Assistant Agricultural Chemist, visited Beaudesert to inquire into the destruction of Khaki Weed by chemical means, and reported that the weed was easily destroyed by common salt (butcher's salt or any coarse, common waste salt) at the rate of 1-2 tons per acre. A weak arsenical solution containing 0.2 per cent. arsenic will also be found effective where the poisonous spray could be used.

The value of salt as a weed destroyer lies in its property of absorbing moisture both from the soil and plant tissues, and so kills the plant by thirst; thus to prove effective it should be applied in hot, dry weather.

In small areas Khaki Weed is best destroyed by hand grubbing or chipping, but as it has the power of sending out roots from the joints there is always the chance, unless the work is carried out in hot, dry weather, of the cut pieces growing again, so that the cut up plants should be all raked up and burnt.

FORAGE POISONING.

FACTS DISCLOSED BY VETERINARY RESEARCH.*

In veterinary literature the term "forage poisoning" is now restricted to a peculiar kind of fodder and forage poisoning, and may be defined as a disease caused by eating foodstuffs which have become poisonous (toxic) through the growth in the fodder of a particular microbe, *Bacillus botulinus*. Horses are most commonly attacked, since it is that animal that is most commonly fed on prepared fodder, though cases in cattle are by no means uncommon, and even sheep and pigs may be affected at times.

It is important to realise that it is not infectious or contagious, and therefore that one animal does not contract it from another. It is only the animals which actually partake of the poison (poisoned foodstuff) that are affected.

One may say that any kind of fodder may at times be possessed of this poisonous property; thus the disease has been found to occur both in pasture-fed and in stabled animals, *i.e.*, it may be contracted from grass pasture or from eating hay, chaff, grain, corn, or silage. It is found, however, that certain of these fodders are more liable than others to be dangerous, and to realise why this should be so we must briefly review what we know of the causal microbe, where it is found, how it may get into fodder and how it grows and produces its poison therein.

Where the Microbe is Found.

This microbe is what is known as a saprophyte; that is, it may be found in soil, dust, or water, and ordinarily lives therein, gaining its nutriment from dead (decomposing) vegetable material. It is not capable of directly attacking either plants or animals in the living state. We have no exact knowledge as yet as to how common it is in the soils of the State, but such examinations have been made in other countries (and are being made here), and from these we have reason to believe that it is far from uncommon. This is supported by the fact that cases of the disease have been met with in the past three years in the Young, Warren, Coonamble, Gundagai, Murwillumbah, Inverell, Riverina, and Narrabri districts. It would appear, therefore, to be somewhat widely distributed. If this is so it may be asked, why is the disease not more common? The answer is that the mere presence of the microbe itself is not sufficient; the conditions for its multiplication must also be present, and, as will be seen, such are quite special and not always available.

Being in the soil, the microbe easily gains access to such fodders as hay, chaff, and silage through the dust raised from the surface soil. It then requires suitable conditions of moisture and warmth in order to multiply, being in this manner like a seed, which, as is well known, will not germinate and thrive unless conditions are adequate. This microbe is, of course, microscopic, and even when multiplying in fodder does not produce any recognisable changes; it of itself does not make the fodder appear in any way unwholesome. Conditions which favour its growth, however, also favour the growth of other micro-organisms, particularly moulds, and thus we frequently find it growing in mouldy fodder. This, however, is not entirely a chance arrangement, for whereas ordinarily this bacillus can grow only in the absence of air, it can grow in fodder exposed to air if it has a growth of mould overlying it. Thus mouldy fodders are more liable to contain this microbe and be dangerous.

This association of the disease with the use of mouldy fodder was responsible for the idea held at one time that the disease was due to mouldy fodder. This is not so. Fodder which is simply mouldy can and does produce digestive substances, but it does not induce the disease we call fodder poisoning unless this particular microbe has been growing in and produced its characteristic poison in such fodder.

Humid Conditions Favour Development.

The degree of warmth necessary is furnished through the greater part of the year in a climate like that of New South Wales, where, even in winter, one finds the days sufficiently warm to allow of mould and bacterial growth. In the summer, however, such is much more liable to occur, and we find therefore that the disease is met with chiefly in summer and autumn, particularly if the latter be mild.

The moisture requirement may be supplied by moisture in the fodder, but in such fodders as hay, grain, or chaff, which are normally somewhat dry, exposure to a shower of rain is especially favouring, and therefore it follows that rain during harvesting or rain on an open stack is liable not only to damage the fodder by inducing mould growth, but also to provide adequate conditions for the growth of the casual microbe of forage poisoning.

* From the "Agricultural Gazette" of New South Wales for March.

Thus it has come to be recognised that the disease is especially liable to be met with in seasons in which, during late spring, summer, or autumn, fodders have been exposed to heavy rains after a warm spell, and again followed by bright sunshine—in other words, humid conditions.

Need for Care with Silage.

Silage is especially liable to be attacked, owing to two factors—(1) its high moisture content, and (2) its liability to become mouldy. As is well known, a well prepared pit or silo shows no mould through the greater part of the stack, but only on the surface, and it is just this mouldy surface layer which is liable to be dangerous. If silage be exposed, however, particularly if a pit be opened and exposed to the weather, the exposed part, previously sound, becomes mouldy, and if it has been contaminated by soil containing this microbe it is liable to contain the poison, and to be dangerous.

Wholesome silage is not likely to be harmful; damaged, mouldy silage may be dangerous, and should not be fed.

Infection in Grass Pasture.

It may be wondered, seeing this is a disease associated with damage to dead plant material, how grass pasture can be dangerous. A moment's reflection, however, will serve to recall that whereas shortly-cropped grass would not be likely to be dangerous, tussocky grass, particularly the rank growths found near creek beds or on inundated land, may easily contain much dead material, both leaf and stalk, and such clumps may be somewhat damaged and mouldy about the butt.

In harvest fields, again, where winnowing is carried out in the paddock, the site of the winnowing operations is marked by the presence of a heap of vegetable material, usually containing more or less grain. Where rain has fallen on this we find it matted down and decomposed to a greater or lesser extent. The sprouted grain is readily sought by any animals which may be grazing in the paddock, and as they nose about in search of it, or, even in search of whole grain, such animals are likely to gather some of this decomposing harvest refuse. Such material offers most suitable conditions for the multiplication of the poison-producing microbe, and there are several cases on record of the disease having been contracted under these conditions.

Two Important Facts.

There are two other facts concerning this poison that must be borne in mind, namely, that among poisons it is ranked as one of the most powerful, and that it is soluble in water. Regarding the first, it may be stated that the poison has never yet been isolated free from extraneous matter. When produced in the laboratory by cultivation of the microbe in broth and subsequent filtration of the broth to remove all solid matter and the microbes themselves, we find such a fluid may be so poisonous that two drops may be sufficient to kill a horse. If the water were removed from such a quantity by evaporation we should have little more than a speck of dust, highly poisonous, but even then not the poison in the pure state.

Being soluble in water, it follows that the poison is easily washed from that part of the stack where it was produced to some other part, and thus we may find that fodder which appears quite sound itself, may, by having been overlaid with damaged fodder and subjected to rain, have had sufficient of the poison washed into it to cause the disease. A further point is that as the poison is so powerful, sufficient may be produced in small "pockets" of mould in the fodder, such pockets being so small and infrequent as to be easily overlooked.

It has further been recognised in some places that the disease may be contracted by animals drinking water that has percolated through decomposed and mouldy vegetation.

Moreover, it has been found in Australia that this disease occurs especially in those seasons when there are mouse plagues, when, of course, there are not only many living but also many dead mice in the stacks, and especially in the chaff therefrom. Such stacks have always a musty odour, and close examination will show that there, especially in the nests, are just the conditions suitable for the multiplication of this microbe, namely, moisture provided by the urine, and warmth from the bodies of the mice. The presence of dead mice, moreover, provides a most suitable breeding-ground for the growth of moulds and other micro-organisms associated with decomposition, a state of affairs which favours the multiplication of this poison-producing microbe—if it be present.

CASSAVA AS A STOCK FOOD.

By G. B. BROOKS, Instructor in Agriculture.

Recently a number of cassava varieties were introduced into Queensland from Java and planted in the Sarina district, the objective being to utilize the tubers or roots for the manufacture of power alcohol. As a result of the publicity given to the production of power alcohol from cassava, quite a large number of applications for cuttings have been received by the Department of Agriculture from farmers for propagation purposes. Owing to the desirability of growing the imported material under close supervision and restricting operations to one district, those requests, unfortunately, could not be complied with. As cuttings from subsequent crops will in all probability be distributed over most of the coastal area, it is essential that intending growers should have some knowledge of the respective varieties raised, otherwise serious results may eventuate when feeding the roots to stock or using as a vegetable.

It may be mentioned that the main objective in the introduction of new high starch-yielding varieties into the State was for the manufacture of power alcohol, consequently the sorts likely to give the best results in this direction were secured, the fact of their being poisonous or otherwise being a secondary consideration.

In Java, cassava is raised extensively as a plantation crop, a factory treating from 400 to 500 tons of tubers per day in the manufacture of flour and tapioca. On the large estates, where as many as 15,000 natives are employed, the extremely poisonous varieties are generally preferred as a safeguard against the stealing of the roots.

Apparently only two varieties were grown in Queensland prior to the recent introductions—*Manihot Utilissima* and *Manihot Aipi*, commonly known as "bitter" and "sweet." It has been found that at least one of these contain poison, cases having occurred where pigs have been affected through being fed on tubers. Quite recently a farmer who has used cassava extensively for pig-feeding purposes reported that his animals got sick occasionally through being fed on raw tubers, but so far none had died. Boiling the roots and discarding the water renders them harmless. Slicing and exposing to the sun for a time is also said to dissipate the poison. The former precaution is recommended.

Although definite information could not be obtained as to the poisonous nature or otherwise of the recently introduced varieties, the following particulars were kindly supplied by Dr. L. Koch, chief of the Plant Breeding Establishment, Buitenzorg, and apply to seven Brazilian sorts procured from that institution.

Mangi and Valenca—Free from prussic acid; can be eaten raw.

Itaparica, Tapicuru, and Basiorao—Somewhat poisonous if fed in large quantities; usually considered non-poisonous.

Sao Pedro Preto—Extremely poisonous.

Creolinha—Also poisonous; unsuitable for feeding purposes.

The leaves of all varieties contain prussic acid, but in such a low percentage that they are used regularly as a cattle food. On one estate 1,200 draught oxen are fed largely on leaves of Red Singapore. It may be mentioned that a consignment of Red Singapore is expected to arrive from Java during the latter end of April.

It being impossible to secure sufficient cuttings of selected varieties in Java, some 70 per cent. of the cassava planted in the Sarina district is necessarily composed of mixed commercial types. This material will be classified, and each variety planted out separately, in order to ascertain yields, starch contents, poisonous properties, &c. Until this is effected the farmers who are growing such should exercise caution in regard to the use of the tubers as a vegetable, or for stock-feeding purposes. Some farmers are, I believe, already using the tubers for table and find them equal to sweet potato.

In South America, and in Java, cassava is one of the principal food crops. In the latter island the annual area under crop is given at 1,674,856 acres. It is estimated that 90 per cent. of the crop is grown and made use of by the natives, either boiled similar to the potato, or ground into flour, and made into cakes, puddings, &c.

Cassava is likely to become popular with farmers as a pig food on account of its hardiness. Most of the consignments secured in Java were planted at Sarina approximately two months after harvesting, and although the soil was extremely dry when the cuttings were put in, a good germination was in most instances obtained. When rain fell, growth was extremely rapid. Its habit of growth is also in its favour, permitting it to stand over in the field for two years if need be, the tubers simply increasing in size with age.

In areas subject to heavy frosts the growing season would undoubtedly be too short to secure high yields. "Mangi" is probably the hardiest of the introduced varieties, growing satisfactorily at an altitude of 3,000 feet. It has also the reputed advantage of being non-poisonous.

It is not intended in this article to deal with the cultivation of the crop, but it may be mentioned that cuttings of mature wood, about 8 inches long, should be planted in an upright position, and only sufficiently deep to ensure growing on a bottom moisture supply. Shallow planting not only favours heavy yields, but induces surface rooting, thereby facilitating harvesting operations.

SURPLUS PRODUCTION AND MARKETING PROBLEMS.

In an address at the annual meeting of the Illinois Agricultural Association held in Champaign, Illinois, Mr. W. M. Jardine, United States Secretary of Agriculture, declared the surplus problem to be a problem underlying the whole agricultural situation. He expressed it as his belief that "something constructive could be done towards reducing the handicaps which surround certain phases of agricultural merchandising," and in alluding to the discussion for the formation of a Federal Farm Board or Commission, Mr. Jardine said that he saw "in a rightly constituted agency of this nature the possibility of attacking the surplus problem in a constructive and scientific way." Declaring that the problems must be dealt with from the farm end, Mr. Jardine added: "I have said repeatedly and I reiterate that a substantial part of the farmer's problems must be solved on the farm." He said that there are at least eight points which should be included in a programme for improvement of the fundamental agricultural situation. In citing taxation as the first, he said that he firmly believed that America's system of valuation could be materially improved and the tax burden of farmers substantially lightened by reducing present inequalities in assessments and by giving greater consideration to the earning power of land in making such assessments.

Referring to the subject of Government land policy, he said that the time had come, in his judgment, to shape public policies of land utilisation definitely to the advantage of agriculture as a whole. This meant that Government should not embark upon uneconomic development projects. It meant wise control of the grazing and dry lands of the Nation. It means that the State and Federal Government should take a hand in reforesting certain land which is clearly submarginal for cultivation. It meant adherence to a broad policy of conservation on the part of the Federal Government.

Agricultural Credit.

The organisation of agricultural credit corporations through which the intermediate credit banks can be reached was also advocated by Mr. Jardine. He declared that there must be substantial readjustments in freight rates and urged the development of co-operative marketing along sound lines. On the subject of the surplus problem he had the following to say:—

"The eighth and last point in the programme I have outlined concerns the surplus problem. Agriculture has always had to contend with wide fluctuations in prices. To some extent these fluctuations have been due to abnormal speculative influences which unduly sway the market one way or the other.

"I believe there is a proper place for the speculative factor in the making of prices, but speculation is occasionally inclined to run to unjustifiable and harmful lengths. Measures have already been taken in co-operation with the officials of some grain exchanges which should go far to eliminate undesirable speculative influences on these markets.

"But, after all, fluctuations in prices are due to economic surpluses more than to any other single cause. Surpluses have characterised our agricultural production since early times. While this is true, it is in more recent times that the surplus problem has assumed serious importance. It was not so many years ago that every farm in this land was practically a self-sufficient unit. In those days farmers measured their prosperity each year by the bountifulness of the crops. A surplus usually was a blessing.

"Then came our great transition from the handcraft to a machine age in agriculture. Specialisation and division of labour went forward with great rapidity both in agriculture and in urban industry. The old rural industries—weaving,

tanning, milling, shoe-making, and the like—were drawn out of the households and the farm communities and concentrated in cities. Inevitably, the farmer ceased to produce all his own necessities on the home farm and began instead to buy them from the factories which would produce them more efficiently and cheaply.

"So we came into an era of commercial agriculture, an era wherein the exchange of commodities assumed as vital a part in the farmer's welfare as production itself. No longer is it the size of the crop that counts but its purchasing power. The surplus frequently is not a blessing to the farmer, for even a small surplus tends disproportionately to lower the market value of the whole product.

"This is the surplus problem—this uncontrollable aspect of agricultural production that tends to put farmers at frequent disadvantage in the field of exchange relations. It is particularly an outgrowth of the transition to the modern commercial system. It is a problem underlying the whole agricultural situation. I believe we must recognise it on that basis.

A National Matter.

"The Nation must recognise this problem for it is a matter of national concern. I believe that public agencies should make every proper effort to co-operate in sound, workable programmes looking to the solution.

"In the first place, we should clearly recognise what the surplus is. It may be a useful and necessary carry-over from one producing season to another, part of which is involved in the process of manufacture and distribution, and part of which is the national reserve against fluctuating seasonal production. It may be over-production beyond the domestic and world demand. From a purely practical point of view, there is the possibility of developing marketing methods which will prevent the carry-over from depressing prices to unfair levels.

"In the field of production there is one important thing that Government agencies can do. They can furnish farmers with a background of economic information which will serve to guide intelligent programmes of production. The Department of Agriculture is already undertaking to collect and disseminate accurate information on production, movement, prices, and consumption of farm products.

"In the field of distribution, public agencies should—as they already do—help the surplus problem at many points. In this field, again, the Government can provide essential background information as a guide to orderly marketing.

"A comprehensive system of standards and grades for farm products should be set up. The Department of Agriculture has made considerable progress on this project. It has already secured establishment of standards and grades for a number of major crops. Its cotton standards are accepted in the world's markets. Such action reduces hazard in marketing and diminishes the margin between the farmer and the consumer.

"Warehouses and terminal storage facilities should be made adequate and stored farm products given a credit status on a par with other commodities. The Act permitting Federal licensing of warehouses illustrates what can be done. Cold storage and merchandising dependent thereon can be developed beyond present limits.

"Many developments will be possible in the credit structure. The system of intermediate credit is a case in point. The intermediate-credit machinery, one of the greatest accomplishments for agriculture, still needs extension, however, to fit the needs of various perishable crops. Some phase of our credit machinery must be evolved that will permit much broader storage of non-perishable crops.

Management and Marketing.

"There are, therefore, manifestly two general avenues of approach to the surplus problem. One is through better management of production, and the other through marketing distribution. In the latter field we have three major issues, the problem of storage of a given harvest pending consumption during the year or season, and the problem of storage for the carry-over. We have in all storage questions immediately the problem of credit. Beyond these two questions of storage and credit we have the third problem, and that is orderly control of the stream of supplies to the consumer. We can solve the first two of these issues by better provision of facilities, but we can only solve the third by collective action.

"I believe farmers, through their organisations, have a most powerful instrument to control the movement of surpluses into consumptive channels. In my judgment the activities of Government agencies in connection with the surplus problem should supplement and assist rather than control and direct the efforts of the farmers themselves and their associations. To accomplish this may call for enabling legislation."

REARING AND FEEDING OF CHICKENS.

P. RUMBALL, Poultry Instructor.

Possibly the most important feature in poultry-keeping is the successful rearing of the young stock. To be profitable in after life, stock have to be well grown and correctly fed from infancy. Many conditions are necessary to obtain this class of stock, but given good sound breeding stock and good incubation, the rearing and feeding are the next essential points.

Rearing.

If the chickens are hen-hatched, very little attention other than keeping them free from vermin, protecting them from predatory animals, and correct feeding are necessary, but when hatched by incubators artificial means of brooding have to be resorted to.

Artificial brooding of chickens is a difficult process with an inefficient plant. The aim is to supply heat or to keep chickens warm, and at the same time wean them from brooders as quickly as possible. No hard and fast rules can be laid down either for artificially-heated brooders or cold brooders. We have to govern our actions by the climatic conditions.

A good illustration of the requirements of brooding is given by the hen. She regulates the heat to the chicks under her care according to the age and weather conditions. If the chickens are young she moves about very little and sits fairly close, gradually increasing the amount of range as the chickens develop. On a cold wet day you will notice her collecting the chickens frequently and warming them up. It does not matter what type of brooder is used, young chickens should be confined to a very limited space until they learn where it is warm. The range can then gradually be increased, and the more outdoor life and healthy exercise they have the better.

Temperature.

In artificially-heated brooders temperature is a very important factor. If insufficient heat is supplied the chicks crowd together. The correct heat is the only method by which this can be prevented. Over-heating is also to be avoided on account of its weakening effect and the difficulty that will be experienced in weaning from the brooders. The general comfort of the chickens is a sure index that the temperature is fairly satisfactory, and if the droppings are well scattered under the hover in the morning, it is proof that the chickens have been fairly comfortable. When the chickens are first put into the brooder, they come from a nursery in the incubator which generally has an average temperature of 90 deg., and it is as well to start your brooding at this temperature, gradually reducing it until heat can be dispensed with in from three to four weeks.

Ventilation.

More chickens are lost annually due to the lack of ventilation than by any other cause. Brooders which are usually made to hold a 100 day-old chickens are generally too small for the same number of chickens a week old. It frequently happens also that the attendant makes no allowance for additional ventilation with the growth of the chickens, and although he has been successful in rearing them to the age of one week they then start crowding and dying. The lack of ventilation has a great weakening effect on both young and old stock. It causes the young to crowd, and renders the older birds more susceptible to disease. When chickens have crowded they present a wet appearance in the morning, to which the term of "sweating" is applied. Sweating is not the cause. The wetness is caused by the condensation of the moisture content of the breath which would have been carried away if proper ventilation had been provided. Chickens which have been overcrowded rarely recover from the ill effects, and it should be avoided at all costs.

In brooding under any system the following are the essential points:—

(1) Limited range, increasing with age.
(2) Sufficient heat, which should be reduced as early as possible.
(3) Ventilation, which should increase with age.
(4) Correct accommodation. What is just enough room for 100 day-old chickens rapidly becomes too little as they grow.
(5) Never attempt to brood chickens of mixed ages.

The Colony Brooder.

Where a large number of chickens are to be reared the colony brooder is the cheapest and possibly as effective as any other type. With this class of brooder several hundred chickens can be run together with little more trouble than would be required for a lot of 100 under most systems.

Five hundred chickens should, however, be the limit in any one colony brooder, but possibly 100 less would give slightly better results.

The colony brooder consists of a heater having a metal hover for the purpose of deflecting the heat. The fuel used in some cases is coke, while other makes are built for burning oil. Whatever type of colony brooder is to be used a special house is necessary. This house should measure approximately 14 ft. by 16 ft., and be at least 6 ft. high. The roof may be either a hip-roof or skillion. The building should be lined and ceiled and provided with ample light.

The house may be built with timber or iron. Iron is to be preferred, being of a more lasting nature, and at the same time it is not easily scaled by rats. The lining and ceiling should for preference be of §-in. tongue and grooved pine, but for economy

Plate 137 (Fig. 1).—Colony Brooder.
Note enclosure of wire netting restraining to some extent the liberty of very young chickens.

sake wheat sacks sewn together and whitewatshed will serve. The floor should be concreted and the iron walls sunk into the ground to the depth of about 1 ft. This prevents rats burrowing under the floor, while the concrete floor is readily cleaned.

It is possible to make use of a less elaborate house for the operating of colony brooders, but it will readily be understood that a house not lined or ceiled will require a greater amount of heat to maintain the desired temperature, with the result of increasing the fuel consumption and attention to heaters.

Cold Brooding.

The term cold brooding is a misnomer. Under this system the heat of the body is retained by means of cloths or flannel and a restricted circulation of air. This method of brooding has been in operation for many years, but it is only recently that the practice has been adopted by commercial poultry breeders. The illustration of cold brooders will convey the nature of their construction. This cold brooder can be operated in brooder-houses or rearing-pens of simple construction. They have given excellent results in Queensland, and are extensively used by a large number of breeders.

Placing Chickens in Brooders.

When chickens are to be placed in brooders from the incubators the floor should have a light dressing of dry soil to absorb any excreta and to give the chickens a good footing. A small amount of litter in the nature of chaff or short straw will provide

exercise and tend to keep the chicks active, especially if some of the scratch grain is occasionally scattered among it. As previously stated, they should be confined somewhat until they learn where they can get warm, and after this encouraged to take as much exercise as possible by ranging either in specially erected runs or at liberty about the farm.

Cleanliness.

Cleanliness in every operation is essential; insanitary conditions not only pollute the atmosphere of the brooders but are frequently the cause of serious epidemics of disease. Where brooders and brooder-houses are thoroughly cleaned vermin cause little or no trouble. Brooder-houses should be cleaned out at least twice weekly, while a daily cleaning of the actual sleeping quarters is recommended.

Weaning.

When chickens are three to four weeks old it is generally necessary to remove them from the brooder-house to make room for younger ones. This is also necessary to protect the soil becoming contaminated by growing stock. Successful and correct brooding will materially assist these operations.

Colony-houses are possibly the most suitable for the housing of the chickens on leaving the brooder. These can be built on slides or wheels and moved about the fields or made fixtures. Under either conditions hurdles or netting-yard are necessary to confine the chickens until they become accustomed to their new quarters. After a week or ten days these hurdles can be removed, and providing the rearing-houses are not too close, little or no trouble is experienced with chickens becoming mixed. The numbers put out together, of course, varies with the accommodation at your disposal, but larger flocks than 100 are not recommended, although cases are known where 300 were put out in one lot and no ill effects experienced. As the stock develop it is possible to cull out the cockerels. This leaves more room for your valuable growing pullets, and protects them from the attentions of the cockerels.

A good size rearing-house for 100 chickens is one 10 ft. long, 8 ft. deep, 6 ft. high in front, and 5 ft. at back, with a 3-in. space between the top of the back wall and roof to provide ventilation. The front should be open and netted in with a gate provided. This enables you to lock the house at night as a protection from predatory animals. A temporary curtain of bag covering half of the front will afford sufficient protection from winds, &c. When the chickens are first placed in this house they are too early to perch. Various arrangements can be made to protect them from crowding into the corner, but the writer has had the best results by bedding them down on baled straw. The straw needs to be fairly deep and loose, with the corners of the house well blocked. The chickens appear to be content to snuggle in the straw instead of making warmth by crowding together. It is then only necessary to go around in the evening with a fork and loosen the straw up, shaking the droppings through on to the floor, which can then be readily cleaned up.

Poultry are largely creatures of habit and can generally with care be trained to act as required. When once they form a habit—good or bad—it is difficult to alter. A little time spent in seeing that chickens go into the house of a night when first placed in a new yard or when they are first let out of the brooders into the netted runs will amply repay poultry-keepers by preventing losses through crowding.

Feeding.

There is a good deal of difference of opinion on this subject. Foods and methods of feeding which answer well with certain lots of chickens, and where operations are on a small scale, are not always workable where hundreds of chickens are to be reared.

Your primary aim is good healthy growth. The speed with which a chicken grows is very rapid, and nothing must be done that will retard it. You cannot be overcautious in the feeding. Some animals can be neglected for a day and not experience any ill effect, but a chicken is such a delicate piece of machinery that great care must be exercised always. When a chicken is born it weighs about 1½ oz., and in six months' time you want it to be a well-developed pullet of 4 lb. or more—that means that it has to make forty times its original weight in six months.

Chickens need no feed for at least forty-eight hours after incubation. Nature has provided for this period, as just prior to hatching the balance of the unabsorbed yolk is drawn into the abdomen, and under natural conditions this food supplies the chicken with its requirements until it has strengthened up. Feeding before this period sets up bowel trouble with the results of heavy mortality. Feeding should be done frequently—little and often is the best policy.

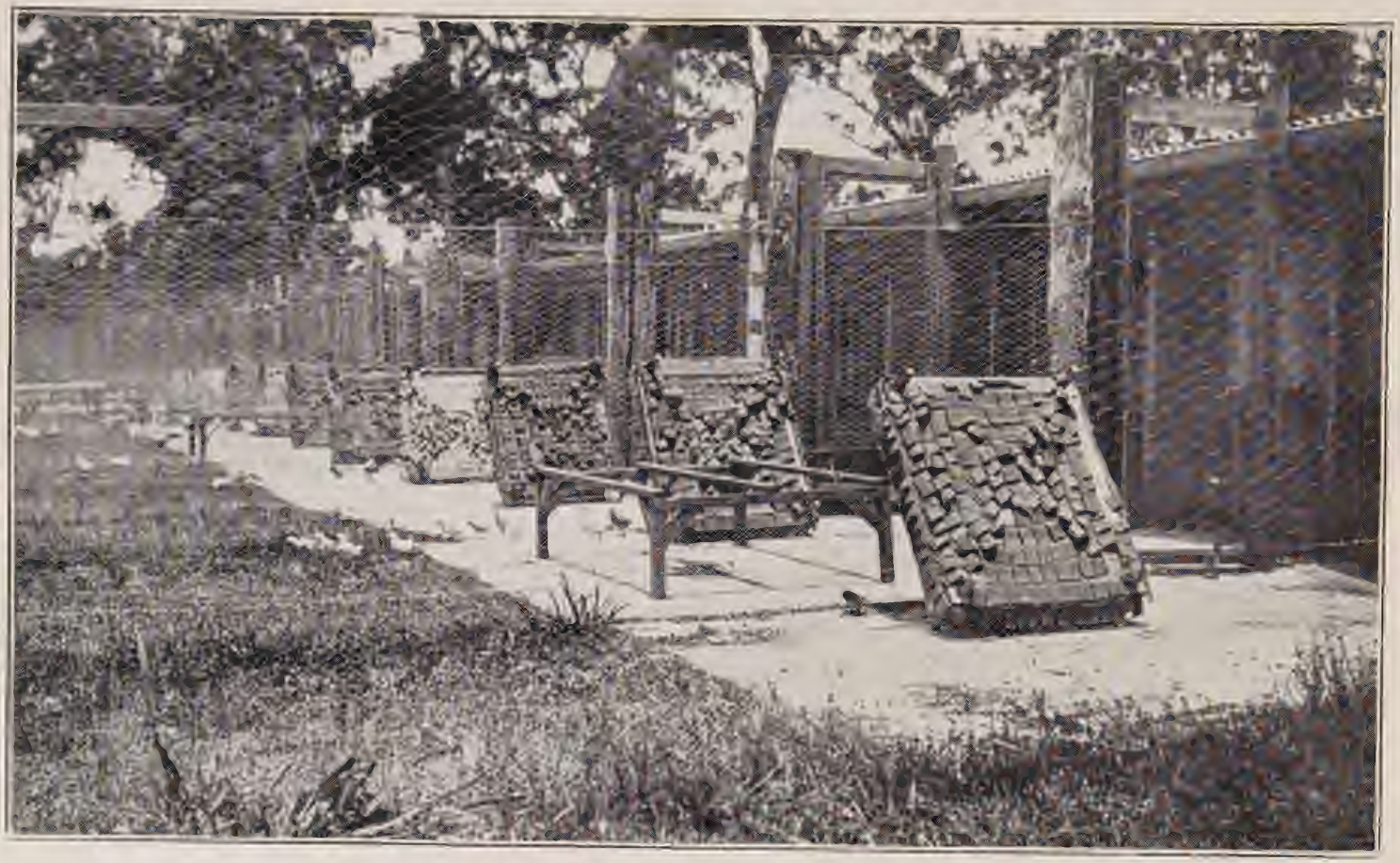


PLATE 138 (Fig. 2).—COLD BROODERS.

Showing numerous Cold Brooders being operated in a continuous house. Brooders taken from the house daily and placed in sun to air.

Kinds of Fowls.

In deciding upon the kinds of foods that are necessary for growing stock, it is desirable to have some idea of the constituents of the body of the animal, as they must all be derived from foods. Slight variations in composition exist, but there is always a certain approximation to the normal, full-grown animal.

Analyses made at the New York Experimental Station gave as an average of a leghorn hen 55.8 per cent. water, 21.6 per cent. protein, 17 per cent. fat, and 3.8 per cent. ash. This is the composition of the whole of the body—bones, blood, feathers, and viscera.

The egg, which is potentially a chick, shows a striking resemblance in analyses to the body of a full-grown bird. Of the dry matter of the egg, apart from the shell, 49.8 per cent. is protein, 38.6 per cent. fat, and 3.5 per cent. ash.

It will be seen, therefore, that about half of the dry matter of the whole body is protein and about 8 per cent. ash. This suggests that slow growth would follow the use of foods which contain small amount of nitrogenous and mineral matter.

Chickens at liberty consume large quantities of protein matter in the form of insect life, but it is not suggested that large quantites of meat-meal should be used. There are many excellent chick foods and growing mashes on the market, and it is questionable if it pays the individual to mix his own. Too many think it an unnecessary expense to purchase these foods, but, from remarks upon the necessity for the

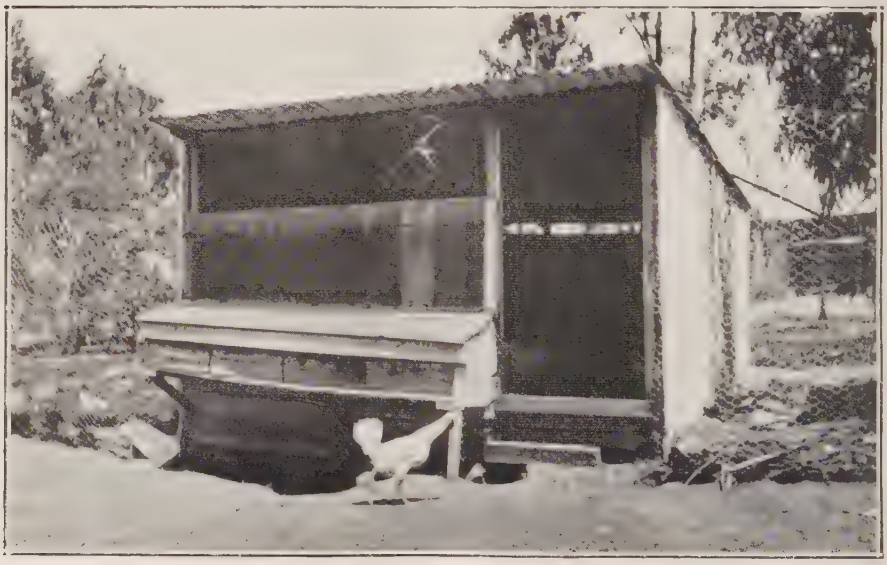


PLATE 139 (Fig. 3).—TYPE OF HOUSE SUITED FOR THE HOUSING OF CHICKENS AFTER LEAVING THE BROODERS

proper development of the stock and those upon the analyses of the bird, it is hoped that the necessity for the correct kinds of foods is demonstrated. Experience has taught us that a balanced ration is necessary for the feeding of chickens as well as for the production of eggs, and that this balance can only be made by using a variety of foods.

When the chickens are first placed in the brooder they should have access to grit or coarse sand. They will eat a little of this, and it will then be in the gizzard ready to deal with the food to follow. Grit should always be in evidence in the pens of chickens, and should consist of quartz or hard shell grit and charcoal.

Drinking water can be supplied immediately on leaving the incubator. This needs to be kept clean and replenished at least twice daily. The inverted bottle and tin is the cheapest water container.

For two days feed rolled oats on a bag or board. The chicks soon learn to pick this up. After this a mixture can be made of good cracked grains, such as hulled oats, skinless barley, wheat, and maize. Some of this grain should be scattered on the litter and the chicks taught to work for their living. This exercise promotes health, develops the bird, and frequently assists in checking the vice of toe-picking. From about four days a dry mash can be fed, composed of one part bran and two parts pollard. For every 20 lb. of the mixture add 1 lb. of the buttermilk powder and 1 lb.

bone-meal and 2 oz. of salt. In mixing the salt, do so with a small quantity of the food first, and then add this to the bulk. By doing this an even distribution is made.

From 6 to 12 weeks.—The buttermilk can be replaced by ½ lb. of meat-meal and ½ lb. of bone-meal. The grain could remain the same, only increased in size. This feeding can be continued until the chicks are twelve weeks of age.

From the 12th week until laying.—The grain can be increased in size until full-sized grain is consumed, and fed once a day. The mash can also be altered considerably by the use of lucerne meal. The mash then could be made of the following constituents:—Lucerne meal, 12 lb.; bran, 26 lb.; pollard, 56 lb.; meat-meal, 2 lb.; bone-meal, 4 lb.; salt to be added at the rate of 10 oz. to the 100 lb. of mash.

Green Feed.

This is essential for the best results, and can be fed after a couple of days. Chickens in their natural state, at liberty, consume large quantities of the most tender growth of grass, &c. Lucerne chaff and lucerne meal are excellent substitutes for green feed, but they are not a suitable food for chickens until they are about at least three months of age. The most suitable green feeds are the tender growths of barley, oats, &c. As the chicks grow they have rape, kale, or lucerne, but always feed it while tender and green.

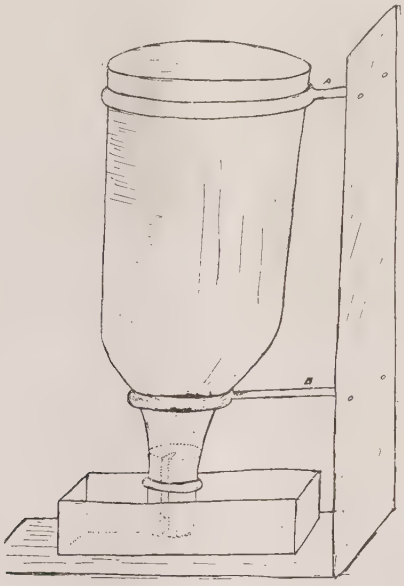


Plate 140.—Rough sketch of inverted Bottle and Tin for water supply to Young Chickens.

The bottle is supported by means of two hoops of wire or hoop iron at A and B to a piece of light pine. The upright is nailed to a foot on which rests a shallow tin where the chickens can drink. A sardine or tobacco tin serves well. A cork, having a V piece removed its entire length allows, when the water in the tin has fallen below the level of the mouth of the bottle, the entrance of air thereby replenishing the water supply.

Milk Feeding.

On a farm there is frequently a surplus of skim milk which can be fed to chickens with advantage. Some interesting experiments were carried out at the College of Agriculture, West Virginia University, on feeding chickens, in which skim milk was used, and it was found that chickens fed on a ration where milk was used—

(1) Consumed more grain;
(2) Grew more rapidly;
(3) Laid earlier than chickens fed on similar foods without milk; and
(4) The mortality in the milk-fed chickens was not so heavy.

The milk may be fed in either a sweet or sour state. If sour, it is claimed by some authorities that it assists in preventing outbreaks of coccidiosis and white diarrhœa. Although dry mashes are recommended, small quantities of wet mash mixed with milk are very beneficial, and, where large quantities of milk are available, animal food in the form of meat-meal or buttermilk is not necessary.

BREEDS OF PIGS—THE TAMWORTH.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Early History of the Breed.

Included in the list of breeds of pigs suited to the climatic conditions and environment of Queensland and to the requirements of both pig producers and the bacon factories, we find the Tamworth breed occupying a much more prominent position now than in former years.

Originally a gaunt, grey, gristly, rough wild type found in the forests and marshes of many of the Midland Counties of England, they were the first breed of pig our forefathers attempted to domesticate and make use of on their farms. The breed did not originate, as many Southern breeders imagine, in the district around Tamworth in New South Wales, but is the original old English native or wild type, taking its name from Tamworth on the borders of Staffordshire and Warwickshire, in England.

The breed has undergone a vast change, however, in recent years, and from the gaunt, grey, gristly, ferocious wild hog of England has been evolved one of the most attractive and profitable of all breeds—a type of pig in great demand especially for the purposes of bacon production in Australia.

The breed was for many years most numerously represented in England in the Counties around Birmingham, but latterly they have been distributed in large numbers to practically every pig-raising country in the world, and in Australia they have forged their way to the forefront in quite a remarkable manner.

Their Special Qualifications.

The Tamworth is pre-eminently a bacon pig, producing a maximum of lean meat from its long fleshy deep-sided carcass. Their popularity in recent years has been gained as a result of their usefulness on the farm for crossbreeding purposes—*i.e.*, for mating with Berkshire and similar medium types for the production of an ideal bacon pig of maximum weight and condition, and with a well-marbled, firm flesh of good quality such as is nowadays required by all bacon curers. The original intention of the improvers of this and other British breeds was not specially to produce this "medium weight" pig, but rather to improve the commercial value of the animal as it was in those days, and to increase both its size, weight, and productive capacity. As a matter of fact, they had a craze for size and weight, both very useful qualities, but both unobtainable without a certain coarseness in the flesh and bone, and with heavy feeding qualities.

The breed as they found it in the wild state exhibited a fierce temper; they were long, lean, gaunt, gristly, and much given to roving. They were not noted for any of the improved qualities which make the breed so successful to-day except constitution and an aptitude to withstand the harsh, rough conditions inseparable from the wild state in which they lived. The early improvers of the type, however, made use of these qualities, and by careful breeding, judicious selection and feeding, with reasonably good housing, they soon began to note that improvement which they so much desired. Then came the demand for size, and Tamworths were fed to enormous weights. The interest created by this craze led breeders to strive to outdo each other in their attempts to "win the prize," and so gradually the conditions under which pigs had been kept were improved upon.

It was as a result of the success thus attained and with the general desire on the part of live stock fanciers for a better class of animal that the next forward step was made—viz., the introduction of the Chinese and Neapolitan breeds, the special objectives being the production of breeds similar to those we now know as the Berkshire and the several types of Yorkshires. The improvers of the Tamworth pig, however, did not approve of the introduction and use of foreign blood, and they stuck to the old type Tamworth and trusted to careful selection and improved methods of feeding and housing to produce the desired characteristics.

Early Importations.

The Tamworth breed was first introduced into Australia by Mr. George Chirnside, of Werribee Park, Victoria, and by the Department of Agriculture of New South Wales for the Hawkesbury College Stud. From the latter stud probably more Tamworth pigs have been distributed during the past twenty-five years than from

[*Photo: Courtesy of Water Conservation and Irrigation Commission, N.S.W.*]

PLATE 141 (FIG. 1).—GRAZING FORMS AN ESSENTIAL PART OF THE PIG'S ECONOMY. PIGS GRAZING ON LUCERNE ON AN IRRIGATION FARM IN N.S.W.

This settler commenced operations with a purebred Tamworth boar and sow and several Berkshire sows. Note the crossbred (spotted) pigs and the parent stock (sows).

any other stud in Australia. Frequent importations have been made since the year 1900, though in recent years it has become quite a difficult problem owing to the embargo against the introduction into Australia of stud pigs from England and America; this on account of those countries having suffered severely from foot and mouth disease.

Tamworths were introduced into Queensland many years ago, and now there are several well known breeders specialising in and exhibiting at shows boars and sows of this famous old breed. The Tamworth has been sufficiently long in Australia to prove that our conditions are congenial to the breed, and that they occupy an important place in the industry.

The Present Day Type.

The Tamworth for many years was not a popular pig—even in his improved form—in the same sense as is the Berkshire. This was not due to any particular fault except perhaps his long nose, but to a general lack of knowledge of the breed and of their useful qualities. However, a wonderful change has taken place, even during the past ten years, and now Tamworths have forged ahead to quite a prominent position, and at our larger State and Interstate Agricultural Shows competition is very keen; the breed is rapidly increasing in popular favour, and the number of animals coming forward for registration in the Herd Book is on the increase.

Tamworths are distinctly "red" in colour, the variation in colour being from a golden-red hair on a flesh-coloured skin, to a dark red or brown, or even a yellowish shade. The colour varies also a good deal in its intensity. There are some types (not by any means desirable) which exhibit a very light yellow or a "ginger" shade, others the reverse; these are very unsatisfactory, and should be rigorously culled. The desirable and popular colour is a golden-red hair on a flesh-coloured skin, free from black splashes, spots or hairs.

In inferior types the conformation also varies, some of the older strains are of a "razorback" build, these are undesirable in every way and should not be tolerated; in fact, with the Tamworth more so than with any breed, only the very best types should be used and in order to ascertain what is the best, breeders should lose no opportunity of studying the types winning in our Royal Shows. The best class of Tamworth is one carrying a compact, deep carcase, well covered with a fine-quality flesh intermingled with a fair percentage of firm, white fat.

The young, growing Tamworth pigs might, to the inexperienced breeder, appear weakly and unthrifty; they certainly look "leggy" and narrow in comparison with more "blocky" breeds, but as they grow, they develop rapidly and fill out. This fault is not so noticeable in the crossbred—*i.e.*, where the Tamworth is mated with the Berkshire, &c., but they certainly require all the attention it is possible to give them, otherwise they will be less profitable than some of the other breeds. Tamworths must be forced along, particularly for the first four or five months, after that they are able to look after themselves better than most other breeds. These failings doubtless account somewhat for a certain timidity amongst breeders in taking up this type. The Tamworth sow invariably develops into an excellent mother, providing an abundant supply of rich milk for her numerous sons and daughters.

Of course, one finds "duffers" amongst this as amongst all other breeds. It is the individual animal that one must judge by, and not the breed, in making a choice of breeding stock. No breed should be condemned on account of there being "black sheep" in the flock.

Tamworths: A Hardy Vigorous Type.

The Tamworth pig does not suffer as a result of sunburn or sunscald, and they thrive in the warmest climates. This makes them especially suitable for our coastal and for the comparatively warm, dry, inland areas. They are, perhaps, not quite so suitable as the Large or Middle Yorkshires for colder climates. The "Tammy" does not like to have his ears "frost-bitten"; he prefers the warmer, more genial climes.

Tamworths have "big" appetites. Some breeders consider this a serious fault, and so it is insofar as a "cottager's" pig is concerned, and this applies in many ways to farmers keeping only one or two "sty" pigs; but to the man who is breeding pigs on a large scale and is feeding them on cheap home-grown foods and to the dairy farmer, it is not at all a serious fault, so long as the animal produces a reasonable amount of increase in weight for food consumed. For this reason it would not be correct to say that the Tamworth makes an ideal suburban pig farmer's type, for there are other breeds and crosses more suited to those conditions—*i.e.*, the Poland-China, the Middle Yorkshire, or the popular Berkshire—these are the types for the "city and suburban" man.

PLATE 142 (Fig. 2).—A THRIFTY, PROFITABLE LITTER.

This illustration of a large, thrifty, and profitable litter of Berkshire-Tamworth cross pigs, the property of Mr. George Stanfield, of "Stanberry," Woodan, indicates the wonderfully prolific nature of carefully selected strains of pigs. Mr. Stanfield states that the litter, fourteen in number, was eight weeks old at the time the photograph was taken. They were sired by a Berkshire boar purchased from Mr. W. Middleton, of Wyreema, and the dam is a Tamworth sow purchased from the stud at Queensland Agricultural High School and College, Gatton. Sows of this cross mated back to an unrelated Berkshire boar also give excellent results in the production of the fleshy early-maturing bacon pigs so much in demand in these days.

The Tamworth is not to be considered a profitable pig at all as a pure-bred (meat) market pig; he must be crossed with the Berkshire, Yorkshire, Poland-China, or possibly Duroc-Jersey to produce the best results. However, the Tamworth is growing in popularity as a "stud" pig, though there have been but few men specialising in these "red" pigs in Australia.

The Tamworth is not a pork butchers' favourite, and even the Tamworth crosses cannot be classed as porkers, though the writer has been forced to judge Tamworth-Berkshire crosses entered as porkers on many occasions at shows, and many dealers like their long fleshy carcases.

The Tamworth is the bacon breeders' ideal type for crossing purposes. The cross between the Tamworth and the several other breeds referred to above are model types if well fed and cared for from birth to maturity. The second cross (but not the mongrel)—that is a Berkshire boar mated with a first-cross Tamworth-Berkshire sow—undoubtedly produces a very fine type of bacon pig. Some curers and breeders like a "dash" of Middle Yorkshire in this type, and prefer the Yorkshire-Tamworth cross. The writer prefers to stick to the "Black and Reds" in these warm climates. All these are important considerations to be remembered when selecting breeding stock. One of the largest breeders of both market and stud pigs in South Australia (Mr. W. H. Bruce) reports wonderful success with the Duroc-Jersey boar crossed with Tamworth sows. Mr. Bruce slaughters many thousands of pigs annually for his shop trade, and has for many years been experimenting with a view to developing the most profitable pork and bacon pig. He considers this Duroc-Jersey-Tamworth cross the beau ideal of the butcher and curer. The writer also favours the Tamworth-Poland-China cross for the purpose indicated, these crosses providing an ideal and early-maturing marketable carcass.

Other Characteristics of the Tamworth.

Contrary to the opinion of some breeders, the Tamworth is a docile, tractable animal, responding, as all animals do, to the character of the treatment accorded them. The sows are possessed to a remarkable degree of the qualities of motherhood, including ease of conception and giving birth to large litters. They produce a liberal supply of milk, and are very attentive to their youngsters.

One writer has said that "long-nosed pigs" are always more prolific and develop into better mothers than short-nosed types; but, whilst there may be something in this, it is by no means true in the case of "wild" or "bush" pigs.

Discussing the Tamworth, one noted English writer says—"As all stockraisers are concerned in producing the best, and nothing but the best, it behoves them to seriously consider the breeding and feeding of the Tamworth pig for crossing with the common barn-yard type of sow, as they produce pigs of the very highest quality at a low cost."

As a show pig the Tamworth has not up till within the past year or two had much to face in the way of competition at Australian shows, as the number of stud Tamworth breeders was limited, but recently with the increasing popularity of the type many other breeders have entered the field, and now competition is decidedly keen and payable prices are being obtained. When properly fed and prepared for the show ring the Tamworth "makes up" into a very attractive animal, commanding attention even from breeders who are adverse to their long body and nose.

It would however be well for the inexperienced breeder to learn all he possibly could about this type before going in too largely for them, especially from a stud breeder's standpoint.

Tamworth Eligible for Entry in the Stud Book.

Tamworth pigs, provided they conform to the recognised standards of the breed, and have been bred from registered stock (or stock eligible for registration), and are properly fed and cared for, may be admitted into the Herd Books of the Australian Stud Pig Breeders' Society, a local branch of which has recently been established. Registration is necessary if the parents or any of the progeny are to be exhibited at any of the Royal Shows or the larger country shows whose rules have been brought into line to provide for this. This registration of stud stock has had a powerful influence for good in the "pig world," and no breed has benefited more than the Tamworth.

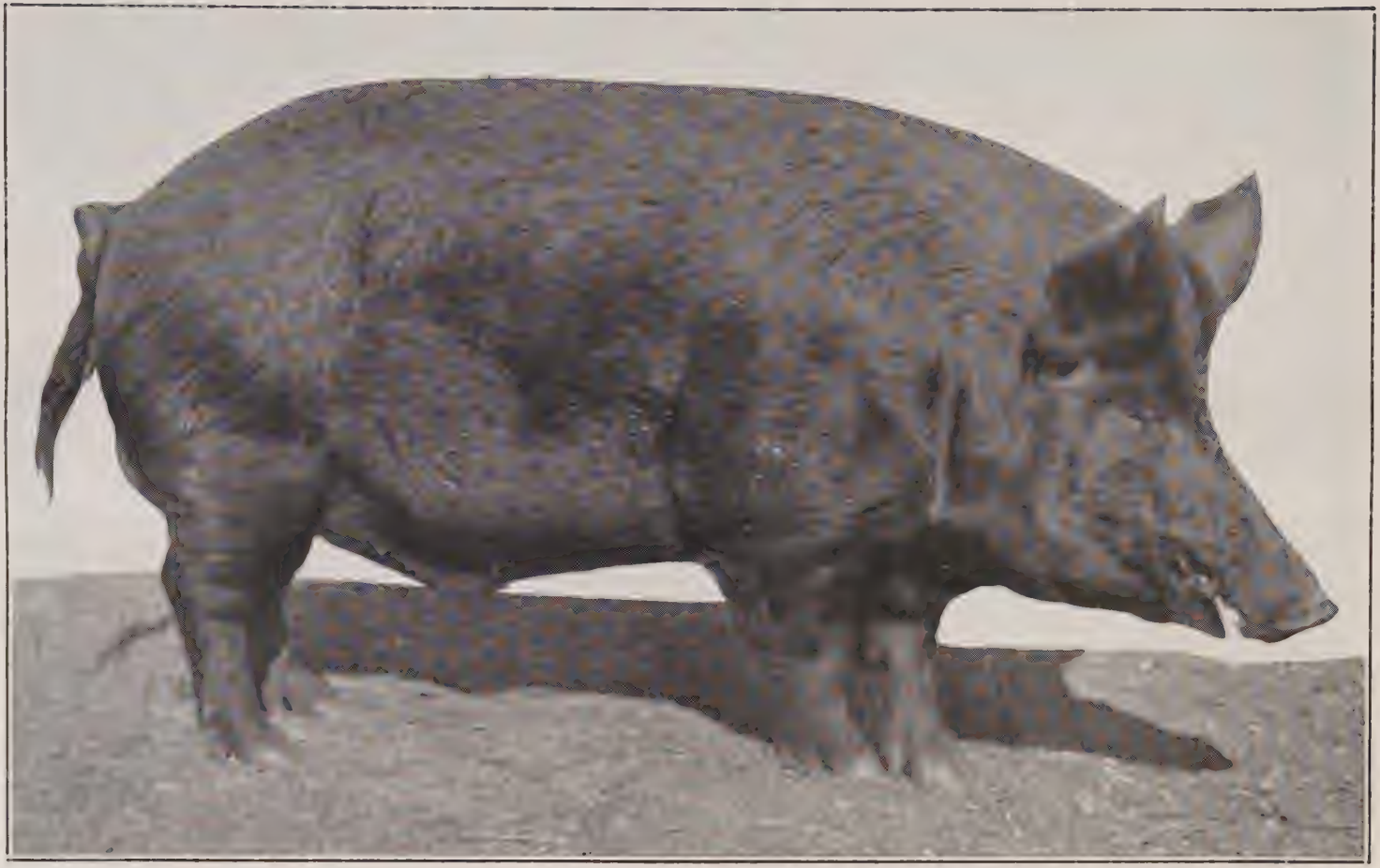


Plate 143 (Fig. 3.)—An Old Champion Tamworth Boar "Sandy MacQueen."
A well-known Australian Prize Winner, until recently property of Mr. J. H. Whittaker, Broxburn Stud Piggery, Broxburn, via Toowoomba.

The principal characteristics of the breed, as set out in the standards adopted by The National Pig Breeders' Association of England, in whose herd books Tamworths may be registered, are as follows:—

STANDARD OF EXCELLENCE, TAMWORTH BOAR OR SOW.

(Revised January, 1925.)

Coat.—Golden red, abundant, straight and fine, and as free from black hairs as possible.

Head.—Not too long, face slightly dished, wide between ears, jowl light.

Ears.—Rather large, with fine fringe, carried rigid, and inclined slightly forward.

Neck.—Light, medium length, proportionately and evenly set on shoulders.

Chest.—Wide and deep.

Shoulders.—Light, free from coarseness, and in alignment with forelegs below, and with side as seen from in front.

Legs.—Strong and shapely, with good quality bone and set well outside body, pasterns short and springy, standing well up on toes.

Back.—Long and level, slightly arched traversely above shoulders.

Loin.—Strong and broad.

Tail.—Set on high and well tasselled.

Sides.—Long and deep.

Belly.—Straight underline, and in a sow a fair number of sound teats evenly placed.

Flank.—Full and well let down.

Hams.—Well developed, deep, full to hocks, and giving a tense appearance.

Skin.—Flesh coloured, free from coarseness, wrinkles, or black spots.

Action.—Firm and free.

In earlier standards of excellence several objectionable features in Tamworths were referred to. We list them here for the benefit of breeders not fully conversant with this type.

Objectionable Features in Both Boar and Sow.

Head.—Narrow forehead, kinked or upturned nose.

Ears.—Thick and coarse or drooping too far forward; loose and lopped ears are also objectionable.

Jowl.—Thick, coarse, and heavy.

Shoulders.—Coarse, heavy, or wide, and open at the top.

Ribs.—Flat or short curved, light back ribs.

Loin.—Narrow or weak.

Belly.—Flaccid, or wanting in muscle, gutty or podgy.

The Disqualifications Included—

Colour.—Black hairs or patches on the skin. (It will be noted these are still considered objectionable.)

In Boars.—Rupture, or only one testicle let down, vicious temper, coarse, wrinkly or ungainly.

In Sows.—Deficiency in or very irregularly placed or blind teats, injured or diseased udders, vicious temper, hollow back, coarse or heavy mane; poor breeding qualities.

THE TAMWORTH AS A BREED SUITABLE FOR CROSSBREEDING.

Experience in this State has demonstrated conclusively that there is no more suitable breed for the purposes of crossbreeding with Berkshires and similar types for the production of long, fleshy, deep sides and flitches of bacon. It has recently been computed by a number of leading English bacon curers that a long, deep-sided pig with fine shoulders, small jowl, and back of moderate width will produce as much as 10 per cent. less of lard parts and an accordingly increased ratio of lean meat. When it is borne in mind that fat (particularly here in Queensland) is only worth half as much as lean, it will be readily appreciated how the Tamworth excels as a remunerative commercial proposition.

PLATE 144 (Fig. 4).—CHAMPION PRIZE-WINNING TAMWORTH SOW "MANNING ELNORA" (243).

This sow appeals as one of the most typical and up to-date Tamworths yet exhibited at Australian Stock. This sow was also a prize-winner at Brisbane Royal National Show. Note her compactness, width, and depth of ham and side and the fine quality hair and skin. An ideal type of breeding sow.

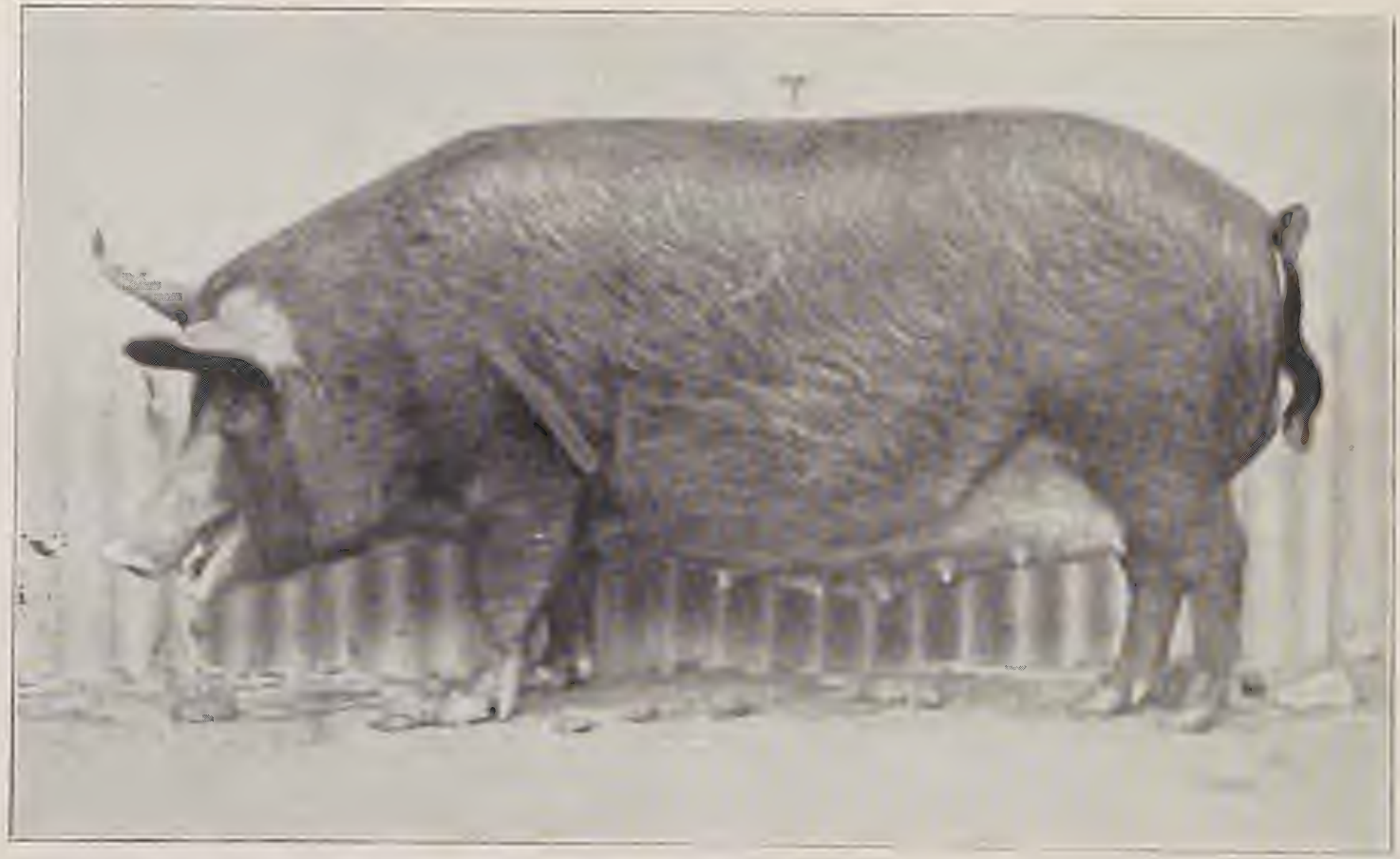


PLATE 145 (Fig. 5).—ANOTHER CHAMPION PRIZE-WINNER. MR. A. N. WHITE'S "ORARA LUCKY" (351)

A daughter of Manning Elates figured in this issue. This sow was purchased by the Instructor in Pig Raising on behalf of Mr. G. H. Barnett, at Leeston, Canterbury, New Zealand. Purchase price 35 guineas, Sydney Royal Show, 1926. The photograph does not do the sow justice though it shows her type and quality. She will be exhibited at New Zealand Shows this year.

Tamworths are good grazers, hardy and prolific breeders, often producing twelve or fourteen pigs at a litter (although ten is a good average). The sows are good sucklers and docile with their young. Apparently in consequence of its robust constitution the Tamworth is particularly free from all diseases, especially swine fever.

An ideal sow of the breed when fully grown should stand about 3 ft. 3 in. to 3 ft. 6 in. high, with a perfectly level side measuring about 4 ft. 6 in. from the point of the shoulder to the back of the thigh; belly close to the ground; while the hair should be fine and silky as indicative of best quality flesh; such a sow would have big hams and plenty of meat on the ribs, from where the best meat is obtained.

Discussing the twentieth century Tamworth in a neat, attractive brochure entitled "The Tamworth Pig of the Twentieth Century," the National Pig Breeders' Association of England, through its courteous, well-informed secretary, Mr. Alec Hobson, has this to say in regard to the modern type:—

"Although not so long as in former years, the nose of the modern Tamworth must not be short, in fact, anything approaching shortness or an inclination for the nose to turn up is very objectionable.

"For crossing with other breeds it is probable that the Tamworth has no equal, this no doubt being attributable to the fact that it is the oldest pure breed in Great Britain. Its type is therefore quite distinct, and its prepotency unequalled. Owing to the length and depth of its sides and other characteristics of the baconer the Tamworth is unexcelled for improving the flesh, fining the shoulders and reducing the jowls of many other breeds. Let it not be assumed, however, that the Tamworth is an uneconomical breed kept pure. Vast improvements have been made in every direction since Mr. Mander Allender, of the Aylesbury Dairy Company, swept the board with his Tamworths and Tamworth crosses at the Smithfield Club Show in 1884, 1885, and 1886, the weighbridge proving the value of this breed when pure, for at the Birmingham Fat Stock Show in 1911 there was only a slight difference between the Tamworths under nine months old and the Large Whites of the same age. The former, five in number, weighed 32 cwt. 1 qr., and the latter about 15 lb. more, a difference so slight that it is perhaps hardly worth mentioning. It is evident, therefore, that the breed can hold its own in the early-maturity classes of the twentieth century.

"A few more figures from Birmingham shows may be of interest: In 1912, eight pairs of Tamworths not exceeding nine months old weighed out at the very good average of 6 cwt. 0 qr. 2 lb. per pair, while the seven single pigs under twelve months old weighed within half a pound of the 28 imperial stone each. In the class for pairs not exceeding nine months old at the 1913 show, the winning pen weighed 6 cwt. 2 qr. 12 lb.

"Not the least significant event in the history of the Tamworth was the performance at Birmingham in 1920 when the breed captured the supreme championship against all breeds. The pen in question weighed 8 cwt. 0 qr. 17 lb. at 11 months, 3 weeks, and although not the heaviest pigs in the show their weight combined with quality gave them an easy lead.

"Previous weights at Smithfield reveal some interesting facts. In the year 1910, five pens—two in each—under nine months of age, averaged 6 cwt. 1 qr. 15 lb., while in subsequent years the averages for pens of the same age averaged as follows:—

1911	5 cwt. 0 qr. 17 lb.
1912	5 cwt. 3 qr. 11 lb.
1913	5 cwt. 2 qr. 12 lb.
1914	5 cwt. 3 qr. 2 lb.
1915	4 cwt. 3 qr. 24 lb.
1916	5 cwt. 3 qr. 0 lb.

"In the classes for Tamworths between nine and twelve months at the same society's shows, the following are the approximate averages of weight:—

1910	7 cwt. 2 qr. 4 lb.
1911	7 cwt. 1 qr. 17 lb.
1912	7 cwt. 0 qr. 22 lb.
1913	8 cwt. 2 qr. 1 lb.
1914	7 cwt. 2 qr. 16 lb.
1915	7 cwt. 2 qr. 9 lb.
1916	7 cwt. 2 qr. 10 lb.

Photo. by courtesy Sport and General Press.]

PLATE 146 (Fig. 6).—TAMWORTH BOAR "KNOWLE SUNSTAR 2ND" (2978.)

Bred by the late Robert Peto at Knowle, Warwickshire, England. A prize-winner at Royal Show, Derby, 1925. This boar represents the type winning in most English Show rings at the present day. He is compact, thick set, carries a well developed ham and has a strong masculine appearance indicative of vigorous constitution and general good health.

"At the Smithfield Show in 1919 the pairs under six months old averaged 3 cwt. 22½ lb., while in 1920 the average for the corresponding class was 2 cwt. 3 qr. 1 lb., the heaviest pen scaling 3 cwt. 3 qr. 2 lb. At the same show the pens between six and nine months of age averaged approximately 5 cwt.

"From the above figures it is clear that the Tamworth more than holds its own with other breeds. Let it be emphasised, too, that the Tamworth is entirely English, no Neapolitan or Chinese blood having been introduced—a fact of which its supporters are justly proud.

"Wherever exported the Tamworth has made a great name for itself. Especially is this the case in the United States of America, Canada, and Australia, for it is essentially an open-air pig, thriving on rough and scanty herbage, in addition to being an equally "good-doer" whether in a hot or cold climate.

Facts.

"*Cross-breeding for Bacon.*—In crossing, the Tamworth may be wisely selected to put on any breed, but particularly the Berkshire, Middle White, or any compact small sow with a tendency to produce a somewhat fat-laden flesh.

"Writing on the Tamworth in recent years, Mr. H. W. Potts, the late Principal of Hawkesbury Agricultural College, Richmond, New South Wales, says:—

> The most satisfactory results have been secured all over Australia by crossing the Tamworth with the Berkshire sow. The resulting progeny mature quickly, and grow into an ideal bacon pig of about 130 lb. to 150 lb. live weight in six months. A similar result may be confidently secured from the Middle White Cross.
>
> In the matter of the acclimatisation, let it be understood that the term embraces the animal's power to accommodate itself to any change in external conditions of life, whether favourable or unfavourable, gradual or sudden. The Tamworth has been sufficiently long in Australia to prove that our conditions are most congenial to the breed.
>
> Here, in the midst of great open spaces, the Tamworth has the opportunity of developing its indigenous predatory instincts. They always were successful foragers, and in this regard they fully maintain their reputation. They thrive under rough grazing and outdoor phases of colonial life. Owing to the possession of an easy, active carriage, muscular development and hardy nature, they are more suited to travel distances to market than the fatter composite breeds, and avoid losing condition. It is also noticed that while their natural instincts favour grazing and life in the open, they respond well and profitably to forced feeding in styes.

Tests of the Breed.

"In relation to the tests conducted in the United States of America, evidence of the Tamworth being an economical pig is summarised in Bulletin No. 47 issued by the Department of Agriculture, Bureau of Animal Industry, and written by Mr. George M. Rommell. He states:—

> These experiments, taken in connection with the evidence of investigators over the entire country, undoubtedly show that the representative pigs of the different breeds do not differ materially either in the rate of gain or the economy with which the gains are made. Any marked differences in the breeds will be manifested in the suitability of the fattened animals for market, and the quality of the carcass on the block. A very notable feature is the showing of the bacon breeds when compared with the lard breeds.
>
> The fact that a pig is a Yorkshire or a Tamworth cannot be taken as *primâ facie* evidence that it will make slow and expensive gains."

Copies of the pamphlet entitled "The Tamworth Pig of the Twentieth Century" may be obtained gratis, with other information relative to the breed from Mr. Alec Hobson, Secretary, National Pig Breeders' Association, 92 Gower street, London, W.C. 1.

In Queensland the destinies of the Tamworth breed, as well as of all the other pure breeds of pigs, is being capably looked after by the local branch of the Australian Stud Pig Breeders' Society, in whose herd-books Tamworth may be registered. The local branch has recently issued a very fine well-illustrated booklet, entitled "Better Pigs on Every Farm." Copies of this booklet may be obtained gratis on application to the Secretary, Mr. R. G. Watson, Inns of Court, Adelaide street, Brisbane, whilst printed matter relative to this and other breeds and on the subject of pig raising may be obtained gratis on application to the Department of Agriculture and Stock, William street, Brisbane, Queensland.

DIARRHOEA OR WHITE SCOUR IN YOUNG PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The following maxims have been compiled as golden rules for the breeder who wishes to ward off attacks of the above dread disease in his pigs:—

1. Be careful not to overfeed the sow immediately before or after farrowing or during the first ten days she is rearing her litter.

2. Watch that you do not feed sour decomposed or musty foods, and be careful also to keep musty, mouldy bedding out of the sow's sty.

3. Avoid changing the sow's food while she is suckling her litter unless it is found to be absolutely necessary; then effect the change gradually.

4. The moment any of the young pigs show the slightest sign of diarrhoea (scouring) reduce the sow's food supply by half, and compel her to take liberal exercise, the object being to reduce the quantity of milk she is producing. Some breeders believe that the sow should have one heaped teaspoonful of copperas (sulphate of iron) dissolved in hot water and placed in her feed; this will do no harm, and certainly would tend to reduce the supply of milk and tone up her system.

It is well to note that when the sow farrows she has an ample supply of milk (or she should have if she is in normal condition) for her progeny, and they soon reduce her normal supply; but some breeders in their enthusiasm and with a desire to give her a good time both before and after farrowing immediately increase her food supply and keep her trough well filled. Under this treatment the sow likewise becomes enthusiastic (it might be said) and produces heavier supplies of milk; consequently, the little fellows get more than is good for them or is necessary, and as their digestive organs cannot effectively deal with the extra supply, the result is that indigestion is set up and this is generally accompanied by inflammation of the stomach and intestines. The pigs then sicken and a feverish condition follows; the bowels refuse to act properly, and grey-coloured, evil-smelling, profuse diarrhoea follows. The young pigs do not immediately lose their appetites, but their condition gradually grows worse, and they begin to die off. The owner frequently thinks they are dying of starvation, and continues to force the sow with food so that she will produce more milk. The sow thus becomes overburdened with milk, and as the suckers gradually drop away from her she cannot get rid of it; inflammation of her udders follows and she also sickens, and will probably suffer to such an extent as to lose her supply of milk altogether. This is commonly referred to as milk fever.

It is necessary to remember that the stomach of the young pig is very small and they require small quantities of food only and at frequent intervals. They are, however, easily overdone and treating them is a difficult matter. To prevent trouble note that the sow should not be fed during the day she farrows; give her a thin gruel only, about eight or ten hours after farrowing, and very gradually increase her food supply after the suckers are born and until they are a week or ten days old. She must have sweet succulent green food, and ample exercise, and when the little fellows are ten days old they may be allowed to explore their surroundings, and gradually become accustomed to following the sow about. If, after all due care is taken to prevent the appearance of white scour in successive litters, it should occur and not yield readily to treatment, it would be better to seek veterinary aid, for the trouble may be due to infection.

To summarise: Immediately there is any sign of scouring in one or more of the young pigs, reduce the sow's food supply by half; compel her and the suckers to take exercise; give copperas in the food as advised; move the sow and suckers to a clean, dry pen, and feed the sow very lightly for a few days. If the ailment persists, give the sow a second dose of medicine (the copperas should be dissolved in hot water before being added to the food); give the suckers teaspoonful doses of castor oil each on the first day, and again next day if still scouring; sprinkle the floors and yards lightly with air slacked lime and keep them scrupulously clean; add a cupful of lime-water to the sow's food every day, and be careful not only to use sweet clean food, but also to place it in a clean food trough in a clean pen. Later, when the young pigs begin to feed "on their own," give them some lime-water, too; it never does them any harm so long as it is not used too freely. The lime-water is readily prepared by taking a tub or barrel, cleaning it out thoroughly, and soaking in clean water for a day or two. Then half-fill with clean rain water, and put about half a bucketful of air-slacked lime in the barrel, and after stirring water and lime together, allow to settle for several hours. It will be noticed that a thin "scum" floats on the surface, and that the water is as clear as crystal. As long as this scum forms daily, the lime-water is good; and the barrel can be refilled after use. Stir the lime up occasionally, and it will be good for two or three weeks at least. When the scum fails to appear on the surface, clean the barrel out, and start again with a fresh supply of lime and water. Never use an iron or tin container for this purpose.

Cleanliness is next to godliness in all matters relating to pig management. Common sense methods of feeding and care are also golden rules, and a knowledge of the cause and effects of the common diseases to which stock are subject will be of the greatest value at all times.

Boiled Rice as a Remedy.

Reference has been made in these pages on several occasions to the disease known as "scour" in young pigs (also called white or yellow scour or diarrhoea), one of the most troublesome of all the scourges to which the young pig is subject; it is likewise one of the most difficult to treat unless treatment is commenced early in the attack.

An American breeder, writing recently on this subject, recommends boiled rice and the water in which the rice has been boiled as a cure for the trouble. This is a very useful remedy; in the case of very young pigs a dessertspoonful of warm rice water two or three times a day will suffice; it must be given in teaspoonful doses as a drench, and the suckers should be kept away from the sow for at least two hours after dosing. Weaners that still have a good appetite should be given both the boiled rice and the rice water, and no other food should be allowed while this is being given.

Scour in young pigs is due in most cases to overfeeding, or to some abnormal condition of the sow's milk. The ailment can, to an extent, be checked by immediately reducing the sow's ration to an absolute minimum and by compelling her and the suckers to take plenty of exercise in the sunshine; they should also be penned in a clean, dry sty after exercise, and the sty in which they were kept should be thoroughly washed out with hot water, to which some coal-tar disinfectant has been added. It is useless treating the suckers unless attention is given to the sow.

It is advisable to carefully regulate the sow's diet in the treatment of scour; she should be given only sweet, clean nourishing foods of the best quality, and the rations should not be too liberal for the first few days after she farrows. As the suckers grow older they naturally require more food, and her supply should gradually be increased so that she can supply more milk.

Further information in connection with this and other diseases of the pig and in connection with pig raising generally may be obtained in pamphlet form from the Department of Agriculture and Stock, Brisbane, at any time.

QUEENSLAND SHOW DATES, 1926.

The following is the official list of Queensland Show Dates for 1926, as issued by the Queensland Chamber of Agricultural Societies:—

Hughenden: 8th and 9th June.
Beaudesert: 8th and 9th June.
Gin Gin: 8th to 10th June.
Mundubbera: 9th and 10th June.
Wowan: 9th and 10th June.
Woombye: 16th and 17th June.
Gayndah: Postponed.
Gladstone: 16th and 17th June.
Lowood: 18th and 19th June.
Mount Larcom: Postponed.
Rockhampton: 23rd to 26th June.
Gatton: 30th June and 1st July.
Kilcoy: 1st and 2nd July.
Biggenden: Postponed.
Mackay: 1st to 3rd July.
Townsville: 6th to 8th July.
Laidley: 7th and 8th July.
Woodford: 8th and 9th July.
Wellington Point: Postponed.
Charters Towers: 14th and 15th July.
Caboolture: 15th and 16th July.
Ingham: 16th and 17th July.
Mount Gravatt: 17th July.
Maleny: 21st and 22nd July.
Rosewood: 23rd and 24th July.
Ayr: 23rd and 24th July.
Ithaca: 24th July.
Barcaldine: 27th and 28th July.
Bowen: 28th and 29th July.
Nambour: 28th and 29th July.
Proserpine: 30th and 31st July.
Pine Rivers: 30th and 31st July.
Redcliffe: 4th and 5th August.
Sunnybank: 7th August.
Royal National: 9th to 14th August.
Crow's Nest: 25th and 26th August.
Coorparoo: 28th August.
Wynnum: 3rd and 4th September.
Imbil: 8th and 9th September.
Zillmere: 11th September.
Gympie: 15th and 16th September.
Beenleigh: 16th and 17th September.
Stephens: 18th September.
Pomona: 22nd and 23rd September.
Malanda: 22nd and 23rd September.
Esk (Camp Drafting): 24th and 25th September.
Melbourne Royal: 16th to 25th September.
Rocklea: 25th September.
Nundah: 1st and 2nd October.
Kenilworth: 7th October.
Southport: 9th October.
Enoggera: 9th October.
Balmoral: 16th October.
Brookfield: 23rd October.

Answers to Correspondents.

Supposed Poisoning of Stock by Grass-tree *(Xanthorrhaea).*

T.P. (Launceston, Tasmania)—

Reference supposed poisoning of stock by grass-tree (*Xanthorrhaea*), the Government Botanist (Mr. C. T. White, F.L.S.), advises that this plant has been popularly associated with the disease known familiarly in Queensland as the North Coast disease. A particular species only was blamed, *i.e.*, a swamp species (*X. hastilis?*), the others not being held responsible, particularly as the trouble was confined to the so-called "Wallum" country on the coast, on which cattle are put during dry spells. This country is very poor, and is composed of low, scrubby, typically Australian Xerophytic vegetation—open forests, plains, and swamps alternating. An account of this so-called "North Coast disease" will be found in the report of the Chief Inspector of Stock for 1919-20, embodied in the Annual Report of the Department of Agriculture and Stock, Brisbane, for 1919-20, p. 68. Later however, the same trouble was found inland at several places, where a grass-tree of another species was growing in abundance (*X. quadrangulata?*).

Most trouble occurred during the late spring and summer months and it is thought that as the cattle eat very freely of the flowering poles, these might be the cause of the trouble, and feeding experiments were commenced at the Stock Experiment Station, Yeerongpilly. These proved negative, but being started late in the season cannot be regarded as very conclusive.

Stock also eat the white heart of the plant, and this also should be experimented with.

Grass-trees have been suspected of being poisonous to stock in New South Wales, and in the "Agricultural Gazette" of New South Wales, Vol. VIII., p. 22, J. H. Maiden quotes J. S. Allen as saying that the settlers in the vicinity of Jervis Bay had informed him that the shoots of the grass-tree, when in blossom, and eaten by cattle, gave them a complaint —"cripples." It appears to affect their joints and doubles them up.

In the same Journal for January, 1914 (Vol. XXV., p. 69), Dr. J. B. Cleland gives the results of feeding tests with the grass-tree leaves at Milson Island. These proved negative.

The whole question of grass-tree poisoning wants much further investigation, in which the botanist, chemist, and veterinarian must co-operate. On some better class grass-tree country, we have reports that cattle, during dry spells, feed freely on grass-tree without any ill-effects following; so it is quite possible that there is some relationship between the trouble and the class of country over which the cattle are running.

Duboisia Leaves.

O.P. (Atherton)—

Re Duboisia leaves, the Government Botanist (Mr. C. T. White, F.L.S.) advises that these are the produce of a native tree, *Duboisia myoporoides*, fairly common in coastal Queensland. It often comes up very thickly as a second growth on scrub farms. The leaves are somewhat poisonous but are rarely, if ever, touched by stock. They are rather fleshy, and dry to paper thickness; the price varies, according to demand, from about 1s. to 2s. 6d. a lb. The demand is limited. Particulars of buyers of these leaves could probably be obtained from the Principal, Pharmacy College, Brisbane. The tree is sometimes known as "Corkwood," due to the thick, corky bark of the old trees, and the light weight of the wood. The trees are most abundant as second undergrowth, and are of robust growth; light green trees and the young stems often coloured purple. If you are not sure of the tree, send Mr. White specimens and he will tell you if you have the right thing or not.

Open Season for Opossums—Native Bears Protected.

An Order in Council has been approved declaring the Open Season for opossum shooting for the year 1926 to be from the 1st June to the 31st July. The Minister for Agriculture, Hon. W. Forgan Smith, stated in the course of a recent Press announcement that Cabinet had also given consideration to the question of the opening or otherwise of the season for native bears; but, after full consideration of all points, Cabinet decided that a season for opossums only should be opened this year.

The Northern Pig Board.

His Excellency the Lieutenant-Governor has approved of a Notice being issued of intention to give power to the Northern Pig Board to take lease of a bacon factory and treat pigs delivered to the Board at such factory, subject, of course, to conditions approved by the Minister. Any petition for a poll to decide whether the Northern Pig Board be given such power must be signed by at least fifty persons, who, at any time within the preceding six months, kept pigs in the Petty Sessions Districts of Atherton, Herberton, Chillagoe, Cairns, Douglas, and Mourilyan.

The Dairy Produce Act.

It has been approved, by Order in Council, that "*The Dairy Produce Act of* 1920" shall be in operation in the Shires of Eacham, Port Douglas, and that part of the Shire of Woothakata which is east of the 145th meridian.

The Broom Millet Board.

The Minister for Agriculture and Stock, Hon. W. Forgan Smith, has appointed Messrs. H. Neimeyer, of Hatton Vale, F. H. V. Goodchild, of Degilbo, and L. R. Macgregor, Director of the Council of Agriculture, to be Members of the Broom Millet Board as from the 18th May, 1926, to the 17th May, 1927.

ORDER IN COUNCIL.

At the Executive Buildings, Brisbane, the twenty-seventh day of May, 1926.

Present:

His Excellency the Lieutenant-Governor in Council.

WHEREAS by an Order in Council dated the nineteenth day of February, 1925, made under "*The Primary Products Pools Acts,* 1922 *to* 1925," Butter produced at Factories in Queensland was declared to be a commodity under and for the purposes of the said Acts for a period of three years as from the date of such Order in Council: And whereas amongst other things by the said Order in Council, a Board was constituted, and the provisions of the said Acts with the modifications set out in the said Order in Council were thereby extended to the said commodity, and the Board so constituted and all persons, things, and matters concerned: And whereas it is desired to amend the said Order in Council as amended by Order in Council dated the 16th day of April, 1926, in manner hereafter appearing: Now, therefore, His Excellency the Lieutenant-Governor, with the advice of the Executive Council, and on the recommendation of the Council of Agriculture, doth hereby order and declare that the first-mentioned Order in Council as amended by Order in Council dated the 16th April, 1926, shall be amended in manner following:—

(*a*) In the first paragraph of clause 2 of the said first-mentioned Order in Council the words "five persons, representatives of growers, together with a person to represent the Council of Agriculture in relation to such commodity," are repealed, and the following is substituted therefor:—"five representatives of the growers and one representative of the Minister."

(*b*) The second paragraph of the said clause 2 is hereby rescinded, and the following inserted in lieu thereof:—"The electors for each Division shall be the Cream Suppliers to the Companies, the names of which Companies are given under that Division, or to any Companies established in that Division after the date of the Order in Council:—

DIVISION No. 1.

The Atherton Tableland Co-operative Butter and Bacon Company, Limited	Atherton	Daintree River Development Company, Limited ..	Daintree, *viâ* Port Douglas
The Atherton Tableland Co-operative Butter and Bacon Company, Limited	Malanda	Dawson Valley Co-operative Company, Limited ..	Wowan
Atherton Tableland Dairy Products, Limited ..	Malanda	The Farmers and Producers' Co-operative Company, Limited	Rockhampton
Bundaberg Co-operative Dairy Company, Limited	Bundaberg	The Port Curtis Co-operative Dairy Company, Limited	Gladstone
The Bushy Creek Co-operative Butter Company, Limited	Julatten, *viâ* Molloy	The Rockhampton District Co-operative Dairy Company, Limited	Rockhampton

DIVISION No. 2.

Gayndah Co-operative Dairy Company, Limited ..	Gayndah
The Maryborough Co-operative Dairy Company, Limited	Biggenden
The Maryborough Co-operative Dairy Company, Limited	Kingaroy
The Maryborough Co-operative Dairy Company, Limited	Maryborough
The Maryborough Co-operative Dairy Company, Limited	Mundubbera
Nanango Co-operative Dairy Company, Limited ..	Nanango
The South Burnett Co-operative Dairy Company, Limited	Murgon

DIVISION No. 3.

The Chinchilla Co-operative Dairy Company, Limited	Chinchilla
The Downs Co-operative Dairy Company, Limited	Clifton
The Downs Co-operative Dairy Company, Limited	Dalby
The Downs Co-operative Dairy Company, Limited	Miles
The Downs Co-operative Dairy Company, Limited	Toowoomba
The Downs Co-operative Dairy Company, Limited	Crow's Nest
Goombungee Co-operative Dairy Company, Limited	Goombungee
The Oakey District Co-operative Butter Company, Limited	Oakey
Roma Co-operative Dairy Company, Limited ..	Roma

DIVISION No. 4.

The Esk Co-operative Dairy Company, Limited ..	Esk
The Killarney Dairy Company, Limited	Killarney
Pioneer Butter Factory (A. M. Linton) ..	North Ipswich
Pommer Bros.	Ipswich
Queensland Agricultural High School and College	Gatton
Queensland Farmers' Co-operative Company, Limited	Booval
Queensland Farmers' Co-operative Company, Limited	Boonah
Queensland Farmers' Co-operative Company, Limited	Grantham
Queensland Farmers' Co-operative Company, Limited	Laidley
The Warwick Butter and Dairying Company, Limited	Allora
The Warwick Butter and Dairying Company, Limited	Goondiwindi
The Warwick Butter and Dairying Company, Limited	Mill Hill
The Warwick Butter and Dairying Company, Limited	Texas

DIVISION No. 5.

Caboolture Co-operative Company, Limited ..	Caboolture
Caboolture Co-operative Company, Limited ..	Pomona
Caboolture Co-operative Company, Limited ..	Eumundi
The Dayboro' Co-operative Dairy Association, Limited	Dayboro'
Kin Kin Co-operative Dairy Company, Limited ..	Kin Kin
The Logan and Albert Co-operative Dairy Company, Limited	Beaudesert
The Maleny Co-operative Dairy Company, Limited	Maleny
The Southern Queensland Dairy Company, Limited	Kingston
The Stanley River Co-operative Company, Limited	Woodford
Wide Bay Co-operative Dairy Company, Limited	Cooroy
Wide Bay Co-operative Dairy Company, Limited	Gympie

"Members elected to hold office after the 31st July, 1926, shall hold office as from the 1st August, 1926, to the 18th February, 1928, both dates inclusive.

"In the event of a vacancy occurring in the office of elected representative a person shall be appointed by the Governor in Council (or elected by the growers, or as may be desired) to fill such vacancy, and shall hold office until the date on which his predecessor would have held office."

(c) Clause 4 of the said Order in Council is hereby rescinded, and the following is inserted in lieu thereof:—

"4. The class of persons who shall be deemed to be growers of the commodity and eligible to vote on any referendum or election in connection with the said Board shall be the Cream Suppliers to the said Companies, or any Companies which may be established after the date of this Order in Council."

And the Honourable the Secretary for Agriculture and Stock is to give the necessary directions herein accordingly.

G. W. WATSON, Clerk of the Council.

Department of Agriculture and Stock,
Brisbane, 27th May, 1926.

NOTICE.

BUTTER BOARD.

NOMINATIONS will be received by the Under Secretary, Department of Agriculture and Stock, Brisbane, until the Twenty-eighth day of June, 1926, for Election as from the 1st August, 1926, to the 18th February, 1928, as Growers' Representatives on the Butter Board. Five such representatives are to be elected by the growers, as defined in the Order in Council dated the 27th May, 1926, a copy of which appears above.

Each nomination is to be signed by at least ten growers, as above, in the Division concerned, in accordance with the terms of the Order in Council.

E. GRAHAM, Under Secretary.

Antarctic Beech ***(Nothofagus Moorei).***

C.C. (Beechmont)—

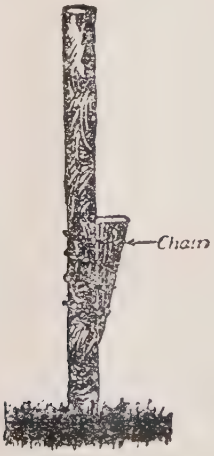
Reference to the age of the Antarctic beech trees of the National Park, the Government Botanist (Mr. C. T. White, F.L.S.) advises that this tree, as you know, is the dominant tree at altitudes above 3,000 feet in the National Park, and the reason why it has survived in this spot is probably climatic.

The only other place where the tree is found is on the higher parts of the Dorrigo, in New South Wales. The botanical name of the tree is *Nothofagus Moorei.* Nothofagus is a genus of about twelve species found in the southern parts of South America, New Zealand, and Australia. Three species are found in Australia, one is an Alpine shrub in Tasmania, another is the Beech Myrtle of Tasmania and Victoria, the third is our "Antarctic Beech," as it is known in New South Wales—"Negro-head Beech."

The genus is of great interest to botanists as representing one of the few examples of the so-called Antarctic or Fuegian element in the Queensland flora. It reaches its northernmost limit of distribution in the Macpherson Range; its present distribution shows its species to be among the most southern of trees and tertiary leaf impressions show it to have at one time inhabited the Antarctic Continent, where at present only two flowering plants are found—a grass and a small herbaceous plant. Regarding the age of the trees, I am afraid it is very hard to express a definite opinion; they must be very, very ancient, but the actual age is difficult to ascertain, as in the older trees you will notice that the central part has rotted away and young trees spring up as root-suckers all round. This means that it is impossible to get at the age of the trees by the annual rings, though these in Australia are of rather doubtful value in assessing the age of trees.

DRIVING POSTS.

In light country, posts may often be driven into the ground; but if a maul be used for the purpose on the head of the post this will usually result in splitting it. If the method of driving posts shown in the illustration from "Country Gentleman" is used this will be avoided. A long, wedge-shaped piece of hardwood that may be cut from the end of a piece of lumber or a small log is chained against the post



with the point of the wedge down. The post is then driven by driving the head of the wedge. This method has another advantage. Often very slender posts are put in for light fences. They are very hard to drive if driven from the top. By this method they may be driven quite easily. Crooked posts may also be driven by this method.

General Notes.

Butter Board.

An Order in Council has been issued amending the constitution of the Butter Board, by declaring that the persons to appoint the growers' representatives on the Board shall be the cream suppliers to the factories, and such cream suppliers will also be eligible to vote on any referendum or election held in connection with the said Board.

Arrowroot Board.

The counting of votes in connection with the election of five members to the Arrowroot Board resulted as follows:—

Lahrs, Johannes (Norwell)	68
Clark, Alexander (Pimpama)	65
Henderson, Alexander McGregor (Redland Bay) ..	65
Stewart, Robert (Ormeau)	64
Oxenford, William Frank (Oxenford)	55
Peachey, Benjamin George (Ormeau)	54
Schipplock, Wilhelm August (Norwell)	34

The elected members will hold office for one year.

Staff Changes and Appointments.

Mr. J. A. Michelmore, of Mackay, has been appointed Owners' Representative on the Northern Coast Opossum Board.

Mr. Frederick Bostock, of the Hawkesbury Agricultural College, has been appointed Assistant Instructor in Pig Raising, Department of Agriculture and Stock, Brisbane.

Mr. H. L. Hall has been appointed Canegrowers' Representative on the Proserpine Local Sugar Cane Prices Board, *vice* Mr. W. B. Biggs, resigned.

Constables A. MacDonald, C. F. Cott, J. T. Morris, and W. Leamy, of Yungaburra, Blair Athol, Millaa Millaa, and Blackbutt respectively, have been appointed Inspectors of Slaughter-houses.

Constable H. Skipper has been appointed Temporary Acting Inspector of Stock during the period he is stationed at Ravenshoe.

The resignation of Mr. L. W. Ball as Manager, Cotton Experimental Farm, Melton, has been accepted as from the 12th May, 1926, as tendered.

The resignation of Mr. W. C. Stables as Honorary Inspector, Diseases in Plants Acts, has been accepted as from the 13th May, 1926, as tendered.

Messrs. R. P. M. Short, W. C. Carmody, C. Queale, J. Nicholson, W. H. Crank, R. T. Cridland, E. J. Tannock, S. J. Monaghan, and W. R. Holmes have been appointed Collectors of Royalty on opossum skins, at the centres at which they are at present stationed, viz.:—Brisbane, Brisbane, Brisbane, Brisbane, Rockhampton, Rockhampton, Emerald, Mackay, and Townsville respectively.

The appointments of Messrs. A. Hossack, D. J. Callaghan, and J. W. Mackay as Inspectors of Dairies have been confirmed as from the 1st November, 1925.

Messrs. R. J. Rollston and C. J. Boast have been appointed Assistant Inspectors of Cane Testers for the 1926-27 crushing season.

Mr. Fred Bostock, of the staff of the Hawkesbury Agricultural College, Richmond, New South Wales, has been appointed assistant to Mr. E. J. Shelton, Instructor in Pig Raising, and has entered upon his work with the Department of Agriculture and Stock. Of a well known Meadowbank (N.S.W.) family, Mr. Bostock was born in 1902. His early education was obtained at the Ashfield Technical School and the Sydney Technical College. A sound training in general farming practice was received at the Bathurst Experiment Farm, where, in addition, Mr. Bostock made a special study of pig raising as a result of which he had no difficulty in qualifying by examination for the Piggery Certificate of the Hawkesbury College. In 1922 Mr. Bostock was appointed Assistant Piggery Instructor at that institution. In his new appointment he will have ample scope, for the pig raising in Queensland is a profitable and rapidly expanding industry. Last year's official figures show that sales of Queensland bacon, hams, and other pig products were considerably over £1,000,000 in value, and at the present rate of progress these figures must soon be doubled.

Americans Eating more Butter.

It is reported that monthly consumption of butter in the United States has increased nearly 30,000,000 lb. since 1920, according to figures compiled by the United States Department of Agriculture. Consumption in 1925 is estimated at 159,000,000 lb. a month compared with 130,000,000 lb. in 1920, being an increase of over 22 per cent.

Egg Board Levy.

Regulations have been approved under the Primary Products Pools Acts, empowering the Egg Board to make on all persons delivering eggs to such Board, a levy at the rate of ½d. per dozen eggs so delivered, as from the 1st July, 1926. Provision is made, however, for egg growers (as defined in the Order in Council constituting the Board) to make a petition for a poll to be held to decide whether the levy shall be made, and such petition must be signed by at least fifty growers of eggs, and must reach the Minister on or before the 30th June, 1926.

Sterility in Pigs.

A great many of the cases of sterility and barrenness in pigs are due to the animals being in an over-fat and lethargic (lazy) condition. There are many instances also in which the boar is in an over-fat condition and lacks sexual vigour. It is unfortunate that many strains of pigs, particularly purebred pigs, have been practically ruined through being kept in very fat show condition for exhibition purposes over lengthy periods; it is equally unfortunate that many of their progeny suffer as a result and fail to breed satisfactorily if they breed at all. These conditions can very largely be overcome by reducing the condition, first by a lessened diet, by the use of green foods, and also by compulsory and regular exercise. Frequent doses of Epsom salts should be given, using from two to four ounce packets per dose in half a pint of warm water, preferably as a drench first thing in the morning. The pigs should be compelled to hunt for part of their living by grazing over good-sized grassed pig paddocks, 1 acre or more in area. Such green foods as lucerne, burseem (Egyptian clover), sorghums, pumpkins, rape, and barley, root crops like sweet potatoes and artichokes, &c., are suggested. Some cases of barrenness are due to septic inflammation of the womb, the result of germ infection due to stock being kept in unclean sties and to boars serving clean sows after having bred to sows suffering from infectious diseases of the womb. In these cases and in all cases where the sows will not hold to the service of the boar it is advised to syringe the uterus out with a solution of one teaspoonful of table salt in one pint of sterile water, *i.e.*, water which has been boiled and allowed to cool down to blood heat. If this does not give satisfactory results try 20 grains of permanganate of potash in one pint of sterile water at blood heat, and follow up with the salt solution every day for three days before service; during treatment also give Epsom salts as recommended above. It is advisable also, if at all possible, to change the boar, using a young vigorous animal. The sows should be kept away from the boar until they are ready for service, and after being stinted they should be immediately taken away and be placed in a clean dry sty, away from all other pigs, and they should be kept very quiet for several hours. If they still seem restless mate them again the following evening and follow same suggestions re separation. Sterility and barrenness are also often induced through the animals being improperly nourished and through their lacking stamina and vitality.

Many sows commence stud duties too young, many boars also are ruined in this way. Neither should be used for stud purposes before ten or twelve months old. Hereditary influence plays an important part, the progeny of shy breeders often failing to breed at all. Injuries to the sexual organs of the male is also a frequent cause of the sows not proving in-pig. The boar may have become weakened through frequent unsuccessful attempts at service—this especially so where a young boar is running with a lot of full-grown sows. The boar in this case is often punished severely by the sows chasing and biting him or by keeping him away from the food trough. It frequently happens that a young boar so injured becomes so "cowed" that he is ever afterwards afraid and he becomes quite effeminate. There are many other causes, too, such as the use of improperly-balanced rations, disease of the breeding organs of the boar, hot, dry, droughty seasons, and so on. The remedy lies in the removal of the cause wherever that is possible and in culling out unsatisfactory breeders.

Messrs. Arnold and Co., Veterinary Medicine Suppliers, of Sydney, advertise what they refer to as a very satisfactory remedy for the treatment of pigs that are unsatisfactory breeders. It should be worth writing them for a trial package, though in a general way we do not recommend the use of medicinal agents for the purpose indicated. It is regretted we do not know of a reliable "cure all" for these troubles, but will be glad to supply any further information required.—E. J. SHELTON, Instructor in Pig Raising.

Potatoes—Exports and Imports.

Regulations under the Diseases in Plants Acts provide that no potatoes shall be exported from or imported into Queensland unless a certificate is obtained from an inspector of the Department of Agriculture and Stock that such potatoes are free from Irish blight, potato blight, or late blight, brown rot, storage rots of potatoes, potato tuber moth, eel worms or nematodes, potato scab, Colorada potato beetle, or any other injurious insect or plant disease to which potatoes are subject. It is further provided that such potatoes shall be packed in new bags or cases, or in clean cases that have not been previously used for holding potatoes.

Bunchy Top in Bananas.

Provision has been made by regulation under the Diseases in Plants Acts, that every occupier, or if there is no occupier, the owner of any land whereon banana plants are or are growing, shall immediately notify the Department of Agriculture should the disease known as "bunchy top" in bananas be present in any banana plants on his land or hereafter make its appearance on any such plant.

As a result of a Proclamation issued under the abovenamed Acts, the removal of any banana plant from or out of any nursery, orchard, or other place, is absolutely prohibited from the 29th April, 1926.

Gympie Butter Factory—Largest in the World.

There is a good deal of truth in the saying, "He who stands still goes back," and it may also be applied to agricultural districts. Notwithstanding the great over-production in sugar, and the fact that the districts north of Townsville have increased their "sweet" output in fifteen years from 57,135 tons to 215,550 tons, and increased their acreage more than 100 per cent., the Innisfail districts are splashing out to have more than one string to their bow. A move is being made to have a butter factory at Silkwood, and it is reported there would not be the slightest difficulty in disposing of 4,000 shares at £1 each, the money to be raised from settlers prepared to milk 700 cows. There are large areas of Crown land—some 10,000 acres—lying idle, and a move is on foot to have it thrown open for dairying. Mackay is moving on similar lines, and a report is being made as to the suitability of the district for dairying. What is being done on the Burdekin to get out of the rut?

Gympie, one of Queensland's leading goldfields of the past, has the largest butter factory in the world, and while on a recent visit to Queensland the Danish Director of Dairies said he was astounded at the magnitude of the factory and its excellent construction, lay-out, and plant. He had not, he stated, seen anything like it in his travels round the world.

In the factory all the most modern dairy machinery and appliances have been installed, and it stands as a monument to the enterprise of the dairymen of the Gympie district.—Abridged from a report in the "Home Hill Observer" reprinted from the "Gympie Truth."

The Sugar Crop.

Owing to the unfavourable weather which has prevailed in most of the sugar areas (states the Acting Premier, Hon. W. Forgan Smith), the crop (which early in the year promised a yield nearly as large as last season's output of 500,000 tons of sugar) has been considerably reduced, latest estimates indicating a production of about 420,000 tons of sugar.

At a conference of canegrowers held at Mackay in January last, resolutions were passed recommending a scheme of allocation under which each mill would be entitled to produce at the Australian price a quantity of sugar based upon the average of its production for last season and its estimate for the coming season.

The resolutions were ultimately presented to the Minister for Agriculture by the Queensland Canegrowers' Council, and the matter has been considered by the Government, but there has not yet been an opportunity of going fully into the scheme, which may involve certain legal and legislative action should it be decided to give effect to the proposals. There is also the necessity of consulting interests other than the growers in the matter. As this could not be done in time for the coming season, a proclamation is being issued under the Sugar Acquisition Act acquiring the sugar as hitherto, the only difference being that, whereas last season sugar was acquired on the basis of 60 per cent. for Australian use and 40 per cent. for export, the proclamation now being issued will provide for 70 per cent. of Australian price and 30 per cent. for export, subject to adjustment at the end of the season when actual tonnages will be known.

Pest Destruction—An American Method.

Details are made available by the Federal Department of Markets and Migration, Melbourne, of a method employed by the United States Department of Agriculture of "baiting" insect pests that they may be the more conveniently killed. The plan apparently is to put out bait which will draw them to a common centre, and then to apply a toxic spray.

The latest attractive agent is known as geraniol, and it has been employed successfully in fighting the Japanese beetle which has invaded New Jersey and other portions of the country. Its utility in this connection was demonstrated during the course of an observation tour conducted in New Jersey recently, when a party consisting of a number of orchardists and entomologists especially interested in the work of the Japanese Beetle Laboratory of the Bureau of Entomology visited about 100 acres of demonstration orchards (peaches, apples, cherries, and grapes), on one of which properties the demonstration was held. The attractor was used to draw the beetles into a limited area as described, where they were destroyed with a spray consisting of oleoresin of pyrethrum and soap. This has been developed at the laboratory during the past season and has given remarkably good results, according to the department.

Proposed Celotex Industry for Queensland.

The Premier (Hon. W. McCormack) has received definite word from America that the proposal for the establishment of the celotex industry in Queensland has not been dropped, and that a representative of the celotex company will be in Australia shortly.

Mr. McCormack said recently that he had received the following cablegram from Mr. H. C. Armstrong, of the Celotex Company, New York:—

"Sir Matthew Nathan indicates that you are under the impression that the celotex project has been dropped. Kindly assure the Government that I have never deviated from my intention to carry it through. A great extension of the operations in America and various new activities, including the formation of a company in England, where considerable celotex construction is proceeding, have involved a large additional capital expenditure, and have prevented the departure of the president for Australia. I thought you were informed of the position. I have the keenest appreciation of the Queensland Government's assistance in the preliminary work, and beg you to accept my assurance that all doubt is eliminated regarding heat and cold resisting qualities. We are satisfied that the Queensland canefields will supply large proportion of the Australian softwood needs with marked improvement in future living conditions. I am having the privilege of entertaining Sir Matthew, and showing him the results achieved here. I will leave for Australia shortly with a full programme."

The Value of Herd Testing.

The dairy industry of this State is of an annual value approximating seven millions sterling, and is expanding rapidly throughout the State on coastal, tableland, and downs areas. Once this industry becomes established in a district other professions, trades, and businesses follow, and thus are created centres of rural and commercial activities.

There are upwards of 500,000 cows used for the purpose of dairy farming in this State, including herds of Jersey, Guernsey, Ayrshire, and Milking Shorthorns. Individual cows of outstanding dairy character and producing ability are met with in many of our dairy herds in this and other States of the Commonwealth. The world's greatest producer of dairy products, "Melba XV. of Darbarla," is one of many famous dairy cows bred on the Darbarla Estate under the direction and control of that wizard in the breeding of high-producing dairy cattle, Mr. Cole.

While we claim excellency in dairy production for individual cows of the leading dairy breeds, we have to admit that the average production of our dairy herds is much below that of the dairy herds of other countries in which the dairying industry occupies a prominent position. It is the team work of the dairy herd, and not the outstanding dairying capabilities of one or two individuals of the herd, that ensures success. The herd tester is the reliable selector of a profitable dairy herd.

The herd is the dairy farmers producing plant, and must be organised, controlled, and directed, so that efficiency may be secured and his business thereby placed on a profitable basis.

The present is a time of rapid progress, the result of scientific research as applied to our varied industries including that of dairying.

One would not attempt to enter the building trade with a broad axe and a saw for a construction plant. Some of our pioneers so equipped built their homes, but conditions have changed and more efficient methods are now adopted.

Are any of our dairy farmers of to-day broad-axe dairymen carrying on their business with an out-of-date plant dairying a herd with a production below the payable line? Let the herd tester with the aid of a Babcock tester scales determine this question of production. Systematic testing of the dairy herds is the chief factor in securing a payable return for each cow milked and cared for on the farm.

Production of large quantities of milk is a characteristic of dairy cows bred on dairy lines from generation to generation and cared for so as to develop dairy character.

You may feed a liberal dairy ration to a cow but she will not respond in production of dairy products if she does not possess dairy characteristics.

Every dairy farmer should ascertain the cost of producing milk on his farm. Having fixed on a payable production basis per cow, he should then by systematic herd testing find out which cows are being dairied at a profit and those that are being kept at a loss. The time has arrived when unprofitable cows should be removed from the dairy herd and from off the dairy farm.

Guesswork methods must give place to the efficient, businesslike system of determination of the relative values of dairy cows. The stability and progress of the industry depends upon an efficient system of herd testing. Herd testing associations will play an important part in placing the industry on a more profitable basis.

The herd testing scheme conducted by the Department of Agriculture and Stock provides for the testing of dairy herds free of cost to the dairy farmers. Many Local Producers' Associations throughout the State are co-operating with this Department in the carrying out of this work.

During 1925 testing season 994 herds located in various centres throughout the State and comprised of 21,918 cows were tested by departmental officers. The average daily yield of milk per head of all cows tested was 16.79 lb. The highest producing herd averaged 46.1 lb. per head per day, while the average daily yield of the lowest producing herd was 6.5 lb. of milk. One cow produced 65.25 lb. of milk in twenty-four hours. The average daily yield of butter fat per head of all cows tested was .68 lb., and the highest daily yield was 2.28 lb., and the lowest .13 lb. of butter fat.

A comparison of the average production of the highest producing herd with that of the lowest producing herd, and by comparing the highest individual yield with the average and lowest yield, provides convincing evidence that there are many cows at present being dairied at a loss throughout this State.

A dairy farmer can raise the production capacity of his herd by adopting the Department's herd-testing scheme, and increase his income considerably.

The records supplied by the official testers will provide a reliable basis on which to cull out unprofitable animals. Herd testing is an essential in the conduct of the dairying business, and will prove a valuable aid to the dairymen of this State.—C. McGRATH, Supervisor of Dairying, in a radio talk to farmers.

Storing Lemons—Efficacy of the Borax Treatment.

Some evidence of the efficacy of the borax treatment for the prevention of blue mould of lemons in store was afforded by an experiment conducted by the Wyong Packing House. On 20th November two bushels of lemons were picked (pulled) and were at once dipped in a 5 per cent. solution of borax at 115 degrees Fahrenheit for five minutes. They were then placed in unpapered old gin cases and stored in an ordinary shed alongside six cases of lemons picked from the same trees by the same grower, but untreated.

On inspection about five days later from eight to fifteen lemons were affected with blue mould in each of the untreated cases, but only one lemon was "mouldy" in the treated fruit, and that was due to a puncture by a protruding nail in the case. The untreated lemons were then sold, as they showed no keeping qualities, but on 24th December the borax-treated lemons were still in excellent condition and were curing splendidly, having changed from their green colour to a light yellow.

Great possibilities appear to exist for borax as a steriliser, as not only is blue mould apparently defeated, but the oil cells in the rind seem to be filled with the chemical and to retain their firm or turgid condition much longer.—"Agricultural Gazette," New South Wales.

Rabbit Extermination.

An interesting test of the Langvarwill Rabbit Exterminator was recently carried out at the Zoological Gardens, Melbourne, before Sir Victor Wilson, Minister for Markets and Migration, some of the Zoological authorities, including the Director, Mr. Wilkie, and a number of pastoralists and business men.

According to the inventors the main feature of the destructor, which is manufactured in two models—one horse-drawn and the other motor mounted—is a cylindrical pipe brick-lined furnace in which a wood fire is lighted and a bed of burning charcoal formed. The inventors say that on the engine being started a suction fan draws atmosphere from the top of the cylinder through the charcoal. The oxygen is burned and the ultimate result is the formation of nitrogen and carbon monoxide which is drawn across water through cooling pipes and forced under pressure through steel hose into the mouth of the rabbit warren.

During the test in question, live rabbits were first placed in a glass case into which the gas was forced. It was found that all the rabbits were killed in 30 seconds. A rabbit warren was then treated and gas forced in for about a minute. The warren was subsequently opened and all rabbits discovered were found to be dead.

The inventors claim that all that is required to produce the gas is ordinary wood fuel, and that the operating costs are low.

Turkey Raising.

Turkey raising in this country is almost exclusively confined to the rearing of comparatively small numbers on farms and stations. No success is known in "farming turkeys" in the same sense as poultry farming is carried on. If for no other reason, the disease entero-hepatitis (blackhead) would make turkey farming too hazardous.

Turkey eggs should be hatched by turkey hens where practicable, but they may be hatched by other hens. Very little success is likely to be obtained with hatching turkey eggs in incubators; probably not more than 25 to 30 per cent. will be found to hatch, although if set under hens for the first half of the period better results are obtained from the incubators.

Turkey hens will be found to set best when they make their own nests; sometimes, however, it is necessary to put shelter over them with a few bushes in front, to make the nest look as natural as possible. Feed and water should, of course, be placed near the nest, so that the hen can help herself. Grain, either maize or wheat, or both may be used.

At hatching time, if the turkey chickens are not hatching all together, they will be better taken away from the hen as they become dry, so that the hen will sit quietly and hatch the balance. When the chickens are taken away they should be put into a basket or box lined with flannel, or some woollen material, and kept warm until the hatch is complete, when they should be given back to the hen; this practice prevents a lot of casualties during hatching time.

The turkey hen with a brood should be confined to a small enclosure for three weeks to prevent her roaming too far and wearying the chickens.

There is no material difference between feeding turkey chickens and other chickens. They should not be given any food for the first thirty-six hours. For the first two days there is probably no better or safer feed to give them than rolled oats or very coarse oatmeal. Some use hard-boiled eggs rubbed up with breadcrumbs, but this entails great care on the part of the attendant to see that it is all eaten up and none left about after each feed, or bowel troubles will result.

After this, the principal feed may consist of pollard and bran mash mixed to a crumbly consistency. To mix this mash properly, proceed by pouring heated milk over the bran, using about one-third bran to two-thirds pollard, and varying the pollard to more or less according to whether it is fine or coarse; add about 4 oz. of common salt to the bushel of dry matter. This should be dissolved in the milk or water with which the feed is mixed.

This feeding should be supplemented by finely-crushed grain, such as wheat or maize, for the evening feed, or a very little may be given during the day, but very young chickens should not be fed on whole grain.

Finely-chaffed lucerne, barley, rape, or other succulent green feed should be given where possible. The chickens should be fed in this way more or less for the first five or six weeks, when the number of feeds may be gradually reduced and adult feeding introduced. Their feed from then on should consist principally of grain. Finely-chopped onions, leeks, &c., are a valuable addition to the ration during mid-growth.

An All-the-Year-Round Feed.

Silage, says "The New Zealand Farmer," is an all-the-year-round feed. It replaces the elements of pasture in winter, and it supplements pasture in summer. If the pasture dries up, as is too often the case, silage tides one over. If the cows are heavy milkers silage can profitably be fed with good pasture, for the variety of succulence encourages the cows to eat more.

Those who criticise silage are the people who have never fed it. The careful man who has used it would not think of trying to dairy without it.

Sheep on the Wheat Farm.

While the utility of sheep on the wheat farm is gradually becoming more generally recognised, many farmers are unfortunately content to use almost any breed of ram, and in many cases the crossbred has become a nondescript animal. It should always be remembered that a poor type of lamb costs as much to keep and as much to market as a high-class one, while the difference in price will amount to many shillings. Similarly, a poor type of ewe costs as much to keep as a good one, but will breed only a poor lamb and give half the weight of poor-quality fleece.

It may cost a little more to buy a good line of ewes or a few good rams, but the extra outlay is amply justified by the return in wool and progeny.

The ewes should not be kept after their mouths begin to break. Old ewes certainly make good mothers, but they give a poor fleece of low weight, and, furthermore, do not thrive in dry times, and they generally die early in drought periods. When they are becoming aged the first opportunity should be taken to fatten and sell them.

Success in lamb raising depends very largely upon successful mating. In some sases this may be difficult to secure, but as a rule it should be arranged to commence towards the middle of April, about which time good green feed should be available. The ewes should be in good condition, but not too fat. It assists if they can be put on some good green feed about a fortnight in advance.

Sheep are very fastidious in regard to water, and should always be provided with a good fresh supply. If the water is dirty they will only drink it with reluctance, and as ample water, particularly when they are on dry feed, is essential, they should drink abundantly. It is, therefore, an advantage to pump water from dams or tanks, and to keep the drinking troughs scrupulously clean.

Bee-Keeping in Dry Times.

The problem for young beekeepers during periods of drought is not so much how to get honey as how to get pollen, and certainly under the adverse conditions often experienced in many inland districts the lack of pollen causes very heavy losses. A suitable substitute for honey has been found in sugar syrup, but trouble came from feeding nitrogenous food, such as rye-meal, pea-meal, cocoa, &c., as a substitute for pollen. Such substitutes are valuable for a short period, but cannot be relied upon if the drought extends through the summer and autumn. The autumn is a period when young vigorous bees are necessary in the hive to carry the colony over the winter.

To minimise losses in bees during extreme conditions, three methods have been used with sufficient success to warrant mention.

1. During the first period of drought in summer pollen substitutes should be tried; small quantities of paste made of rye-meal or pea-meal, mixed with honey and fed inside the hive, should be given. Some apiarists prefer to feed the meal from shallow vessels placed about the apiary without mixing. Cocoa has lately come under notice, and beneficial results have been reported by a number of apiarists.

2. If the drought conditions extend into the autumn, it will become a matter of preserving enough bees of sufficient stamina to carry the colonies over the winter, and to give a chance of recovery in the spring. If during progressive times the apiarist reserves a good number of combs which have pollen sealed under honey, then these can be distributed among the colonies, thereby giving a chance of a fair number of vigorous bees being raised, but pollen not sealed under honey deteriorates in value as a food.

3. The commercial apiarist should, if it is at all possible, take note of the flora, and if there is no promise of bloom, and it appears possible that the drought will continue, inquiries should be made with a view of finding a locality showing brighter prospects. The temporary removal of bees (usually towards the coastal districts) is the surest method available of minimising losses. Even late in the autumn, after all local prospect has vanished, a fair recovery can often be made in this way.

Not More Cows, but Better.

Twenty cents out of every dollar that the average American family spends in food goes for dairy products, states Dr. C. W. Larsen, United States Bureau of Dairying. From the standpoint of the amount of nourishment obtained per dollar spent, dairy products are the cheapest food. But human population is increasing at a much faster rate than cow population. At the same time, per capita consumption of milk is growing as people learn more of the health-giving qualities of dairy products. What is needed most, however, is not more cows, but better.

Putting on the Brake.

"The land policy of the United States should be reconstructed in such a way as to check undue expansion," declares the United States Department of Agriculture, in a bulletin outlining what the Department says the new policy should be, which appears to be summed up in the warning caption, "Go slow in farm area expansion." It is recommended that there be a classification of privately-owned as well as the public lands, and "a systematic and co-ordinated plan of action based on it, not to directly repress individual initiative, but to educate it by research work."

Co-operative Marketing in the United States.

The following extracts from the Annual Report to Congress recently presented by the Secretary of Agriculture in the United States Government are interesting:—

"The most distinct and significant movement in American agriculture in this decade is the almost universal trend toward co-operation in the marketing and distribution of farm products. It is in no sense a regional or sectional movement, for it exists in all sections and is participated in to some extent by producers of practically all kinds of farm products.

"There has been some co-operation by farmers in the United States for many years, but within the last two decades, and particularly during the last decade, the movement has assumed proportions which indicate that it is a response to a fundamental and universal need of present-day American agriculture. It is highly significant from all points of view that the best minds in agriculture, without regard to region or commodity, are unanimous in the opinion that group action in marketing must be added to individual efficiency in production if the high standards of American farm life are to be preserved and agriculture is to maintain its proper place in our national life.

"Although co-operative marketing is a farmers' movement, it is not in any proper sense a selfish class movement and holds no menace either to consumers or other business interests. Agricultural production is essential to national welfare, and the only guarantee of an adequate and dependable supply of agricultural products is a prosperous and contented agricultural population. It is obvious to any thoughtful mind that this happy result cannot be obtained by agriculture unless it avails itself of the efficiencies and economies of organisation and specialisation which characterise other industries in this day. Consideration alike of intelligent self-interest and public welfare must prompt other classes to support wise and intelligent efforts of farmers to place their important industry upon a basis of stability and prosperity.

"To place our agricultural production on a stable and profitable basis we must recognise the inseparable relation between production and marketing. The working out of a more efficient marketing system must go hand in hand with an intelligent adjustment of production to market demand in a more orderly manner so as to avoid periods of over-production with great loss and periods of under-production with prices unsatisfactory to the consuming public. That agricultural production may more readily become responsive to the market demands, the farmers will have to organise for marketing through the development of sound farmer-owned and controlled co-operative associations.

"I view co-operation in agriculture as a business agency serving the producers both as an intelligent guide in their production programme and an effective instrument for merchandising farm products. Instead of thinking of co-operation among farmers as a producing proposition or as a selling proposition, we need to think of co-operation as a business form or organisation that penetrates our whole agricultural industry. By this I mean co-operation, in an educational way, must reach back to production practices and forward through efficient business organisation to marketing practices. It is from this concept that I look upon co-operation as a 'business form or organisation' adapted to the farming industry."

Denmark Fears Competition in Foodstuffs.

Following the example of some of the New Zealand dairies, Danish butter producers propose to pack their produce in half-pound and pound packets, and an expert committee has been appointed to examine the best methods by which this may be done to meet competition in the British markets. This step is a direct outcome of the progress which colonial butter is making in public favour in the United Kingdom.

The increase in the German tariff has greatly interfered with Denmark's butter trade with Germany; and if, as is expected, the American duty on imported butter is raised from 8 to 12 cents per lb., the effect will probably be to divert to Great Britain supplies of New Zealand and Australian butter which, in the ordinary course, would be shipped to the United States. This development is feared in Denmark as likely to have a further detrimental influence upon the demand for Danish butter in this country.—"Times Trade Supplement."

Keeping Fowl Houses Clean.

The best spray for keeping or getting poultry houses clear of vermin is kerosene emulsion used as frequently as may be necessary.

To make the emulsion, take 8 oz. of soft soap and dissolve it in 1 gallon of boiling water; take the mixture off the fire and add slowly 1 gallon of kerosene, stirring all the time. This mixture should be agitated briskly until the oil and the soapy water are thoroughly emulsified. These 2 gallons are then designated the "stock." Add to this 10 gallons of soft water. Hard water will not do, nor should lime or any caustic substance come in contact with it, or the result will be that the oil will separate from the soapy water, and the emulsion will be spoiled.

If it be desired to make the spray also a disinfectant, add 1 tablespoonful of miscible carbolic acid to each gallon of emulsion. The whole should be kept well stirred, especially when adding water.

A small force pump suitable for this work, which can be stood in a kerosene tin and held down by means of a footrest that is provided, is obtainable, complete, with a short length of hose and nozzle at about 32s. 6d. in Sydney.

Should the vermin be confined to the roosts, these might be washed over with a brush in place of spraying.

The method described above is the only way in which it is possible to make the emulsion, and unless it is followed exactly the product will be useless. If the oil and water are not thoroughly emulsified (mixed) the oil will float on top of the soapy water and the mixture will be absolutely ineffective.

How to Detect Non-Laying Hens.

It is possible for the experienced eye to run over a flock of hens and very closely to approximate the daily number of eggs being laid, and to pick out the hens that are not actually laying from those that are—and this only by the condition of the hens! Many of those that are not laying can be recognised at once by the shrunken condition of the comb, wattles, face, and eyes. There will be others in which these features are less pronounced, and which are in a stage of going off or coming on—at this time of the year mostly the former.

But one can get a still closer estimate by handling the birds. The guide in this case is the pelvic bones. If the pelvis is closed to, say, 1 inch or less, and the bones have become rigid and hard instead of wide apart and pliable, it is a sure indication that the hen has ceased to lay or to develop oscytes, in which case she will be off laying for some considerable time. If, on the other hand, the bones are neither wide or closed, but are a medium width apart, it is an indication that the state of laying, while it might be suspended, is not yet a decided factor. If the pelvic bones are sufficiently wide to admit of the free passage of an egg, and they are supple so that then can become relaxed, it is a sign that the hen is in laying condition.

These two bones are situated one on either side of the vent, slightly above it, and, as a rule, they are only just covered by skin. There are finer points of judgment which can only come as a matter of experience. The idea that the measure of a hen's capacity as a layer can be determined by the distance between the pelvic bones should not be entertained seriously, but expansion and contraction are a fairly reliable guide as to whether a bird is laying or not laying. A little practice should make anyone with ordinary intelligence sufficiently proficient to cull the actual non-layers from the layers.—"Agricultural and Pastoral Notes," Department of Agriculture, New South Wales.

Cover Cropping—Some Important Rules.

The upkeep or humus in orchard soils is of great importance, but the ploughing in of cover crops must be done with great caution or more harm than good may be occasioned.

In our inland parts, where the rainfall is only just sufficient for the healthy growth of the tree and production of fruit, it is only during an abnormally wet year that a cover crop can be grown. As it is impossible to forecast with certainty how the season is going to continue, some risk is involved even in a wet year. In districts of much higher rainfalls the risk is less, of course, as one has only to fear the exception when the rainfall is short. Where water is available for irrigation this danger is eliminated, though it must not be forgotten that the cover crop (whether it be a sown crop or a crop of weeds) is competing with the trees, and extra water must be allowed accordingly.

Cover crops should be sown early in order to obtain as much growth as possible before ploughing time in the winter. A leguminous crop should be sown if possible. Straw crops should be avoided among trees.

Make sure of having the cover crop all ploughed under by the middle of July, regardless of whether it has reached its full growth or not. If it is allowed to remain longer and the season turns dry, the trees and coming crop may suffer from loss of moisture. Even where this risk can be eliminated by applying water artificially it is still necessary to plough under before the end of winter, in order to give time for the cover crop to rot and render available to the trees in the spring the plant-foods it contains, and which it has largely absorbed from the soil.

If a dry autumn occurs after an early sown crop has made a good start, and the citrus trees commence to show signs of distress, the cover crop should be sacrificed if water cannot be applied. Whether green manuring can be practised in an orchard or not, every opportunity should be made use of to apply any bulk organic matter to the soil which will rot down and form humus.—A. and P. Notes, Department of Agriculture, New South Wales.

British Trade in Frozen Eggs—An Interesting Suggestion.

In a report received by the Federal Department of Markets and Migration, Melbourne, the Commercial Officer at Australia House, London, states that the intention of the Imperial Government to prohibit the importation of eggs preserved with boracic acid will undoubtedly create a big demand for liquid yolks preserved by freezing, and, in his opinion, the opportunity appears to be an excellent one for the shipment to England of eggs which do not meet the standard required for eggs in shell. It is understood that it is the practice to separate the yolk from the white, and to freeze the yolk, the albumen being dried and shipped separately.

A London firm which is said to be largely interested in the egg trade stated that when the regulations referred to become operative, the equivalent of the amount of preserved liquid yolk and dried albumen now imported from China will have to reach Britain either frozen or in shell. Of these two forms, this firm states, the frozen egg has many advantages for commercial use over those in shell, and as it is a commercial article that has to be replaced, it is, in the opinion of this firm, safe to assume that the demand in Great Britain for frozen eggs (not in shell) will increase enormously, with an obvious advance in prices. This firm gave the following reasons why previous effort by Australia to establish this trade failed:—

1. Lack of care in excluding musty or tainted eggs.

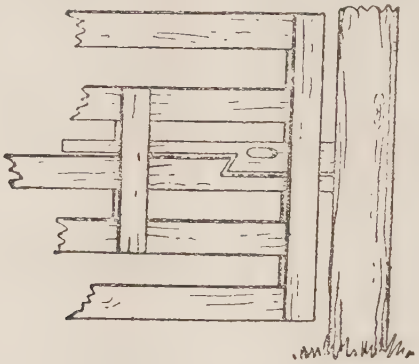
2. Impurities such as straw and portions of shell in the eggs.

3. Competition with China, which produced a highly superior article at competitive prices.

This firm (the name of which can be obtained on application to the Department of Markets and Migration), states that the present time is an opportune one for the establishment of this trade, and gives as one of their reasons that China, which now exercises practically a monopoly of the trade, is constantly in a state of revolution, with the consequent disorganisation of supplies. The firm offers its services to any Australian firm or association likely to be interested in this trade.

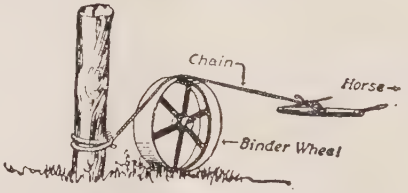
SURE AND SIMPLE.

Here is a gate latch that is easy to make and sure in its action. The stock cannot open this, though the plan of it is so simple that no explanation other than the sketch is needed to show how it is made and operated.



PULLING STUBBORN POSTS.

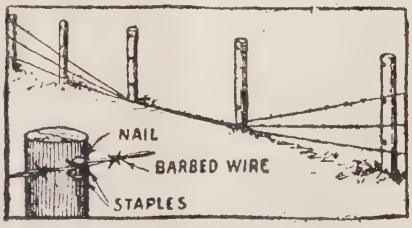
Even though an old fence post be set in the ground firm and fast, it is a simple matter to pull the post if a strong implement wheel or wheel from a discarded oil engine, a stout chain, and a horse are available. All that is necessary is first to fasten the chain securely around the post that has outlived its usefulness at a point about four inches above the ground.



The wheel is set up so that its tire is close to the post. The chain is strung circumferentially over the wheel and its free end fastened to a swingletree. When the horse is hitched to the swingletree and exerts his strength in a forward pull, the chain rolls over the tire of the wheel and the post comes out of the ground as easily as the dentist extracts a baby tooth.

FENCE OPENING WITHOUT CUTTING WIRES.

Farmers often loosen the wires of a fence from a few posts and weigh them down to make a temporary opening which can easily be made into a permanent gate that the casual observer would hardly notice. Instead of fastening the wire



to the posts in the usual manner, staples are driven horizontally on each side of the wire. The staples are set into the post far enough to leave an eye through which a nail is inserted to hold the wire to the post. The wires are kept down by hooking them over nails driven into the post near the bottom.

Orchard Notes for July.

THE COASTAL DISTRICTS.

The marketing of citrus fruits will continue to occupy the attention of growers. The same care in the handling, grading, and packing of the fruit that has been so strongly insisted upon in these monthly notes must be continued if satisfactory returns are to be expected. Despite the advice that has been given over and over again, some growers still fail to grasp the importance of placing their fruit on the market in the best possible condition, and persist in marketing it ungraded; good, blemished, and inferior fruit being met with in the same case. This, to say the least, is very bad business, and as some growers will not take the necessary trouble to grade and pack properly, there is only one thing to do, and that is to insist on the observance of standards of quality and see that the fruit offered for sale complies with the standards prescribed, and that cases are marked accordingly.

Where the crop has been gathered, the trees may be given such winter pruning as may be necessary, such as the removal of broken or diseased limbs or branches, and the pruning of any superfluous wood from the centre of the tree. Where gumming of any kind is seen it should be at once attended to. If at the collar of the tree and attacking the main roots, the earth should be removed from around the trunk and main roots—all diseased wood, bark, and roots should be cut away, and the whole of the exposed parts painted with Bordeaux paste.

When treated do not fill in the soil around the main roots, but allow them to be exposed to the air for some time, as this tends to check any further gumming. When the gum is on the trunk or main limbs of the tree cut away all diseased bark and wood till a healthy growth is met with and cover the wounds with Bordeaux paste.

If the main limbs are infested with scale insects or attacked by any kind of moss, lichen, or fungus growth, they should be sprayed with lime sulphur.

Towards the end of the month all young trees should be carefully examined for the presence of elephant beetles, which, in addition to eating the leaves and young bark, lay their eggs in the fork of the tree. When the young hatch out they eat their way through to the wood and then work between the wood and the bark, eventually ringbarking one or more of the main limbs, or even the trunk. A dressing of strong lime sulphur to the trunk and fork of the tree, if applied before the beetles lay their eggs, will act as a preventative. In the warmer localities a careful watch should also be kept for the first appearance of any sucking bugs, and to destroy any that may be found. If this is done systematically by all growers the damage done by this pest will be very much reduced.

Citrus trees may be planted throughout the month. Take care to see that the work is done in acordance with the instructions given in the June notes. All worn-out trees should be taken out, provided the root system is too far gone to be renovated, but when the root system is still good the top of the tree should be removed till sound, healthy wood is met with, and the portion left should be painted with a strong solution of lime sulphur. If this is done the tree will make a clean, healthy growth in spring.

The inclusion of a wide range of varieties in citrus orchards—and which has been the general practice—is to be deprecated. Even in new plantations there is a tendency to follow the same unprofitable lines. Far too much consideration is given to the vendor's description or the purchaser's appreciation of a particular variety or varieties. Individual tastes must be subordinated to market requirements, and the selection of varieties to the best available kind of early, medium, and late fruits. Amongst oranges Joppa should be placed first, Sabina for early fruit, and Valencia or Loon Giru Gong for late markets.

In mandarins local conditions influence several varieties, and since the introduction of the fungus known as "scab" the inclusion, particularly on volcanic soil, of the Glen Retreat and Emperor types is risky. In alluvial lands, Emperor and Sovereign (an improved Glen Retreat) are the most profitable, though Scarlet in many places is worth including, with King of Siam as a late fruit. This commanded the highest price realised for mandarins last season.

Land intended for bananas and pineapples may be got ready, and existing plantations should be kept in a well-cultivated condition so as to retain moisture in the soil.

Bananas intended for Southern markets may be allowed to become fully developed, but not coloured, as they carry well during the colder months of the year, unless they meet with a very cold spell when passing through the New England district of New South Wales.

The winter crop of smoothleaf pines will commence to ripen towards the end of the month, and when free from blackheart (the result of a cold winter) or from fruitlet core rot, they are good for canning, as they are of firm texture and stand handling. Where there is any danger of frost or even of cold winds, it pays to cover pines and also the bunches of bananas. Bush hay is used for the former, and sacking for the latter.

Strawberries should be plentiful during the month, provided the weather is suitable to their development, but if there is an insufficient rainfall, then irrigation is required to produce a crop. Strawberries, like all other fruits, pay well for careful handling, grading, and packing, well-packed boxes always realising a much higher price than indifferently packed ones on the local market. Where strawberries show signs of leaf blight or mildew, spray with Bordeaux mixture for the former and with sulphide of soda for the latter.

When custard apples fail to ripen when gathered, try the effect of placing them in the banana-ripening rooms, and they will soon soften instead of turning black.

GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

July is a busy month for the growers of deciduous fruits, as the important work of winter pruning should, if possible, be completed before the end of the month, so as to give plenty of time for spraying and getting the orchard into proper trim before spring growth starts.

In pruning, follow the advice given in the June number; and if you are not thoroughly conversant with the work, get the advice of one or other of the Departmental officers stationed in the district.

Pruning is one of the most important orchard operations, as the following and succeeding seasons' crops depend very largely on the manner in which it is carried out. It regulates the growth as well as the number and size of the fruit, as if too much bearing wood is left, there is a chance of the tree setting many more fruits than it can properly mature, with a result that unless it is rigorously thinned out, it is undersized and unsaleable. On the other hand, it is not advisable to unduly reduce the quantity of bearing wood, or a small crop of overgrown fruit may be the result.

Apples, pears, and European varieties of plums produce their fruits on spurs that are formed on wood of two-years' growth or more; apricots and Japanese plums on new growth, and on spurs; but peaches and nectarines always on wood of the previous season's growth. Once peachwood has fruited it will not produce any more from the same season's wood, though it may develop spurs having a new growth or new laterals which will produce fruit.

The pruning of the peaches and nectarines, therefore, necessitates the leaving of sufficient new wood on the tree each season to carry a full crop, as well as the leaving of buds from which to grow new wood for the succeeding year's crop. In other words, one not only prunes for the immediately succeeding crop, but also for that of the following season.

All prunings should be gathered and burnt, as any disease that may be on the wood is thoroughly destroyed. When pruned, the trees are ready for their winter spraying with lime-sulphur.

All kinds of deciduous trees may be planted during the month provided the ground is in a proper state to plant them. If not, it is better to delay planting until August, and carry out the necessary work in the interval. The preparation of new land for planting may be continued, although it is somewhat late in the season, as new land is always the better for being given a chance to mellow and sweeten before being planted. Do not prune vines yet on the Granite Belt; they can, however, be pruned on the Downs and in the western districts.

Trees of all kinds, including citrus, can also be planted in suitable situations on the Downs and western districts, and the pruning of deciduous trees should be concluded there. If the winter has been very dry, and the soil is badly in need of moisture, all orchards in the western districts, after being pruned and ploughed, should receive a thorough irrigation (where water is available) about the end of the month, so as to provide moisture for the use of the trees when they start growth. Irrigation should be followed by a thorough cultivation of the land to conserve the water so applied. As frequently mentioned in these notes, irrigation and cultivation must go hand in hand if the best results are to be obtained, especially in our hot and dry districts.

Farm and Garden Notes for July.

FIELD.—Practically the whole of the work on the land for this month will be confined to the cultivation of winter crops, which should be now making good growth, and to the preparation of land for the large variety of crops which can be sown next month. Early-maturing varieties of wheat may be sown this month. The harvesting of late-sown maize will be nearing completion, and all old stalks should be ploughed in and allowed to rot. Clean up all headlands of weeds and rubbish, and for this purpose nothing equals a good fire. Mangels, swedes, and other root crops should be now well away, and should be ready for thinning out. Frosts, which can be expected almost for a certainty this month, will do much towards ridding the land of insect pests and checking weed growth. Cotton-picking should be now practically finished and the land under preparation for the next crop. The young lucerne should be becoming well established; the first cutting should be made before the plants flower—in fact, as soon as they are strong enough to stand the mowing machine, and the cutting of subsequent crops should be as frequent as the growth and development of the lucerne plants permit. Ordinarily cutting should be regulated to fit in with the early flowering period—*i.e.*, when about one-third of the plants in the crop are in flower.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. In fine weather get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will not want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, holy-hocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, cockscombs, phloxes, sweet peas, lupins, &c., Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. K. CHAPMAN.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

1926.	MAY.		JUNE.		MOONRISE. MAY.	JUNE.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6·20	5·18	6 38	5·2	7·58	9·50
2	6 21	5 17	6 38	5·2	8 52	10 55
3	6 21	5 17	6 38	5·1	9·50	11·57
4	6 22	5 16	6 39	5·1	10 53	nil
						a.m.
5	6 22	5·16	6·39	5·1	11 58	1·0
6	6 23	5 15	6 39	5·1	nil	2·1
					a.m.	
7	6·23	5·15	6·40	5 1	1 2	3·2
8	6 24	5 14	6·40	5·1	2 5	4 3
9	6 24	5·13	6 41	5·1	3·8	5 2
10	6 25	5·12	6 41	5·1	4 11	6·1
11	6 25	5·11	6·41	5·1	5·12	6·58
12	6 26	5·11	6·42	5·1	6 12	7·54
13	6·26	5 10	6·42	5 1	7 13	8·45
14	6 27	5 10	6 43	5·1	8·14	9 32
15	6 27	5·9	6 43	5·1	9·11	10·14
16	6·28	5 9	6 43	5 1	10 4	10·53
17	6 29	5·8	6·44	5·1	10·54	11·28
						p.m.
18	6 30	5·7	6 44	5·2	11 39	12·2
					p.m.	
19	6 31	5·6	6 44	5·2	12·18	12·33
20	6·32	5 6	6·44	5·2	12·54	1·6
21	6·32	5 5	6·44	5 2	1·30	1·39
22	6 33	5·5	6 44	5 3	2·2	2·16
23	6·33	5·5	6·44	5 3	2·36	2·56
24	6·34	5·4	6·45	5·3	3·7	3·41
25	6·34	5 4	6·45	5·3	3·43	4·30
26	6 35	5·3	6·45	5·4	4·21	5·29
27	6·35	5·3	6 45	5·4	5·4	6·31
28	6 36	5·3	6·45	5·4	6·0	7·38
29	6·36	5·2	6·45	5·5	6·44	8·45
30	6·37	5·2	6·45	5·5	7·42	9·50
31	6·38	5·2	...	...	8·46	...

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

5 May ☾ Last Quarter 1 13 p.m.
12 ,, ● New Moon 8 55 a.m.
20 ,, ☽ First Quarter 3 48 a.m.
27 ,, ○ Full Moon 9 49 p.m.

Perigee, 7th May, at 3 42 p.m.
Apogee, 20th May, at 3 48 a.m.

An occultation of the star Delta Capricorni will occur at an early hour on the 10th May when the Moon will be not far from the eastern horizon in a crescent shape tilted up, with the horns somewhat toward the right. The star will disappear behind the bright edge of the Moon about 3·20 a.m., and reappear about 50 minutes later on the dark edge of the Moon. A pair of binoculars or small telescope should make this an interesting spectacle.

The big planet Uranus will appear as a tiny star just below the much more brilliant Venus before sunrise on the 5th; binoculars will be required to see Uranus. The ringed planet Saturn will be in opposition to the Sun on the 14th and, rising about sunset, will be a beautiful object for observation in a telescope during the early hours of the evening.

About 9 p.m. on the 26th a conjunction of the planets Saturn with the Moon will occur when they are high up in the N.N.E. in the direction of Libra with the Scorpion on the right.

3 June ☾ Last Quarter 6 9 p.m.
10 ,, ● New Moon 8 8 p.m.
18 ,, ☽ First Quarter 9 14 p.m.
26 ,, ○ Full Moon 7 13 a.m.

Perigee, 1st June, at 4 24 p.m.
Apogee, 16th June, at 10 18 p.m.
Perigee, 28th June, at 7 48 p.m.

About one hour before sunrise on the 2nd the star Gamma Capricorni will disappear behind the eastern edge of the Moon; it will not reappear until about the time of sunrise when it will be less observable. Mercury will be invisible in the early part of June being in superior conjunction with the Sun on the 5th, but towards the end of the month it will be visible somewhat indistinctly low down in the west about an hour after sunset.

On the 22nd at 2·30 p.m. the Sun will arrive at its greatest northern declination and the solstice will occur; the sun having reached its greatest northern declination, will pause and turn to come southward again. Saturn will be in conjunct on with the Moon on the 22nd at 3 a.m., when Saturn will appear the uppermost at a distance of about four times the diameter of the Moon to the south. On the night of the 26th about 12·15 a.m., Omicron Sagittarii will disappear behind the lower eastern edge of the Moon and will reappear on the lower western edge about 12·30 a.m. Jupiter will be in conjunction with the Moon on the 29th at 9·39 p.m., when the planet will be about five times the diameter of the Moon to the left of it.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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